Light and Lighting

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CONTENTS

The Quality of Light

NEVER in the past was there such a variety of man-made sources of light as that from which we can now choose, if we are particular about the quality of the light we use. By "quality" is meant spectral mixture or "colour," and, thanks to the readiness with which this can be varied by phosphor selection for fluorescent tubes, we have already almost an *embarras de richesses* of "near white" lights. Two new such colours have just been added to the range with which we have been familiar for some time, and one of these has been developed expressly to blend well with the light of tungsten lamps as well as, by itself, to render colours much as we are accustomed to appreciate them under tungsten lighting. One of the most notable virtues justly claimed for the quality of light given by earlier fluorescent tubes was that of blending well with daylight. If it is a virtue of the latest tubes that their light blends well with "tungsten light," this suggests that "conditioning" to the colour of tungsten light as the nocturnal normal has been very thorough. There is certainly no doubt that the domestic use of fluorescent light has been restricted partly because its quality has not hitherto found favour among many people in their role as home-dwellers—and particularly among the females of the species—and it remains to be seen how much the new lamp will popularise fluorescent lighting in the home.

Notes and News

Sir John Parsons

Last month the I.E.S. conferred Honorary Membership upon Sir John H. Parsons, who was the first chairman of the Council and is one of the most distinguished men ever to be associated with the Society. Honorary Membership is the highest distinction the Society can bestow: there cannot be more than six Honorary Members at any one time, nor can more than one such member be created in any one year. Sir John is now in his eighty-sixth year and is the oldest living founder-member and past-president of the Society. He was present at the informal dinner in February, 1909, when it was decided to form the Society, and he was actually invited to become its first president. He declined this invitation because he felt that, during its inaugural year, it would be more fitting if an engineer rather than an ophthalmologist held office. So although, as chairman of the Council, Sir John presided at the outset over the executive body, he did not accept office as president until 1921, when he succeeded the late Mr. A. P. Trotter. It was in this year that he was elected a Fellow of the Royal Society. Two years earlier he had been made a Commander of the Most Excellent Order of the British Empire and, at this time, he was chairman of a committee set up by the I.E.S. to make recommendations for the prevention of eyestrain in cinemas. In 1922, whilst still president of the I.E.S., he was knighted.

As an ophthalmologist Sir John's career has been most distinguished, and he is now the doyen of his profession in this country. For many years he was surgeon and, later, consulting surgeon at the Royal London Ophthalmic Hospital (Moorfields), as well as ophthalmic surgeon and, subsequently, consultant at University College Hospital, London. He is a Fellow of University College, a Fellow and past-president of the Royal Society of Medicine, a Fellow of the Royal College of Surgeons, and, of course, a Fellow of the Illuminating Engineering Society. Besides his degrees in medicine and surgery he is a D.Sc. of London and of Bristol, and in 1927 he received the degree of LL.D at Edinburgh.

Sir John has served on numerous Government committees. He was appointed a member of the Departmental Committee on Lighting in Factories and Workshops when it was originally set up by the Home Secretary in January, 1913. After World War I this committee was reconstituted, and it was again reconstituted when the Factories Act of 1937 came into force. Sir John, however continued to serve on the committee and is a signatory of each of its five reports, the first of which was made in 1915 and the last in 1940. For four years he was a member of the Medical Research Council and chairman of the Council's Physiology of Vision Committee. Under the aegis of this committee some of the most fruitful researches were made, including the well-known and admirable work of Lythgoe on illumination and visual acuity and on flicker, some of Professor W. D. Wright's work on colour vision, and the work of Weston and Adams on the relief of eyestrain in industry. Sir John also served on the Illumination Research Committee of the Department of Scientific

Sir John Parsons

and Industrial Research, which " fathered " the work of Stiles on glare and that of other N.P.L. workers in the field of illumination research. Jointly with the M.R.C. this committee also sponsored the work of Weston and Taylor on illumination and efficiency in type-setting, of Adams on lighting and efficiency in rough work, and the later work of Weston which led to his " Proposals for a New Lighting Code."

Sir John presented the first technical paper to the I.E.S. at a meeting on January 11, 1910, held at the Royal Society of Arts. His subject was Glare, its Causes and Effects, and this paper, which aroused international discussion, was published in this journal (then called " The Illuminating Engineer "), vol. 3, p. 99, February, 1910. His other writings are numerous and erudite. They include a treatise on " The Pathology of the Eye," in four volumes, " Diseases of the Eye "—now in its twelfth edition, and two volumes published in the Cambridge Psychological Library, namely, " Introduction to the Study of Colour Vision " and " Introduction to the Theory of

Perception." Sir John's interest in psychological topics is not confined to those immediately concerned with vision; it goes wider and deeper. His book " Mind and the Nation " was published in 1918, and his latest book, a neuro-psychological study entitled " The Springs of Conduct," was published as recently as 1950 when he was in his eighty-second year. During World War II he gave the address to the I.E.S. after the annual meeting of 1943, and this address, entitled Light and Vision, is to be found in Trans. I.E.S. (Lond.), **8**, 99, 1943. He was present at the first convention of the I.E.S. held in London in 1946, when he paid a tribute to Mr. J. S. Dow, to whom a presentation was made on his retirement from the office of honorary secretary.

It has been fortunate indeed that an eye specialist of such intellectual stature, scientific attainments, and breadth of " vision " should have concerned himself so intimately with the I.E.S. at its birth, and during its critical formative years, and that his efforts and influence should have been used so constantly for so long in furthering scientific investigations into problems of lighting and vision.

Theories of Colour Vision

At the meeting of the Physical Society's Colour Group, held at the Imperial College on Wednesday, February 17, there was an entertaining exchange of views on colour vision theories and their proper place in colour science.

The chairman of the Group, Dr. L. C. Thomson, read a paper entitled " A Study of the Appearance of Spectral Colours and Their Relationship to Müller's Theory of Vision." In this he described work done on the naming of spectral colours presented in random order to an observer. In particular the transition points between certain pairs of colours, e.g., yellow and red, were studied and it was found that these points could be located with remarkable accuracy, of the order of 2mμ for the orange point, for instance. The method was used to verify predictions of colour appearance made by Müller's theory and a considerable degree of confirmation was shown.

Prof. Wright, in argumentative mood, laid about him uncompromisingly and did not spare the previous speaker or others who, as he put it, wasted time on theorising unprofitably when there were still many gaps in our knowledge of the phenomena of colour vision. He entitled his lecture " Some Conservative Thoughts on the Trichromatic Theory " and pointed out that one of the main criticisms of this theory, viz., the lack of any histological evidence of three receptors in the retina, would apply equally to most of the other theories. His chief complaint was that the theories were too far removed from the solid basis of experimental fact: the object of a theory, he said, was to co-ordinate and interpret data and to give a stimulus to new experiments. He then went on to list those areas in the field of our knowledge of colour vision which called for cultivation by the research worker. When we had more information on these matters, said Prof. Wright, we could go on to elaborate theories of colour vision; until then, such elaboration was largely a waste of time and we should be well advised to continue to think in terms of the orthodox trichromatic theory.

An Optical Journal for Europe

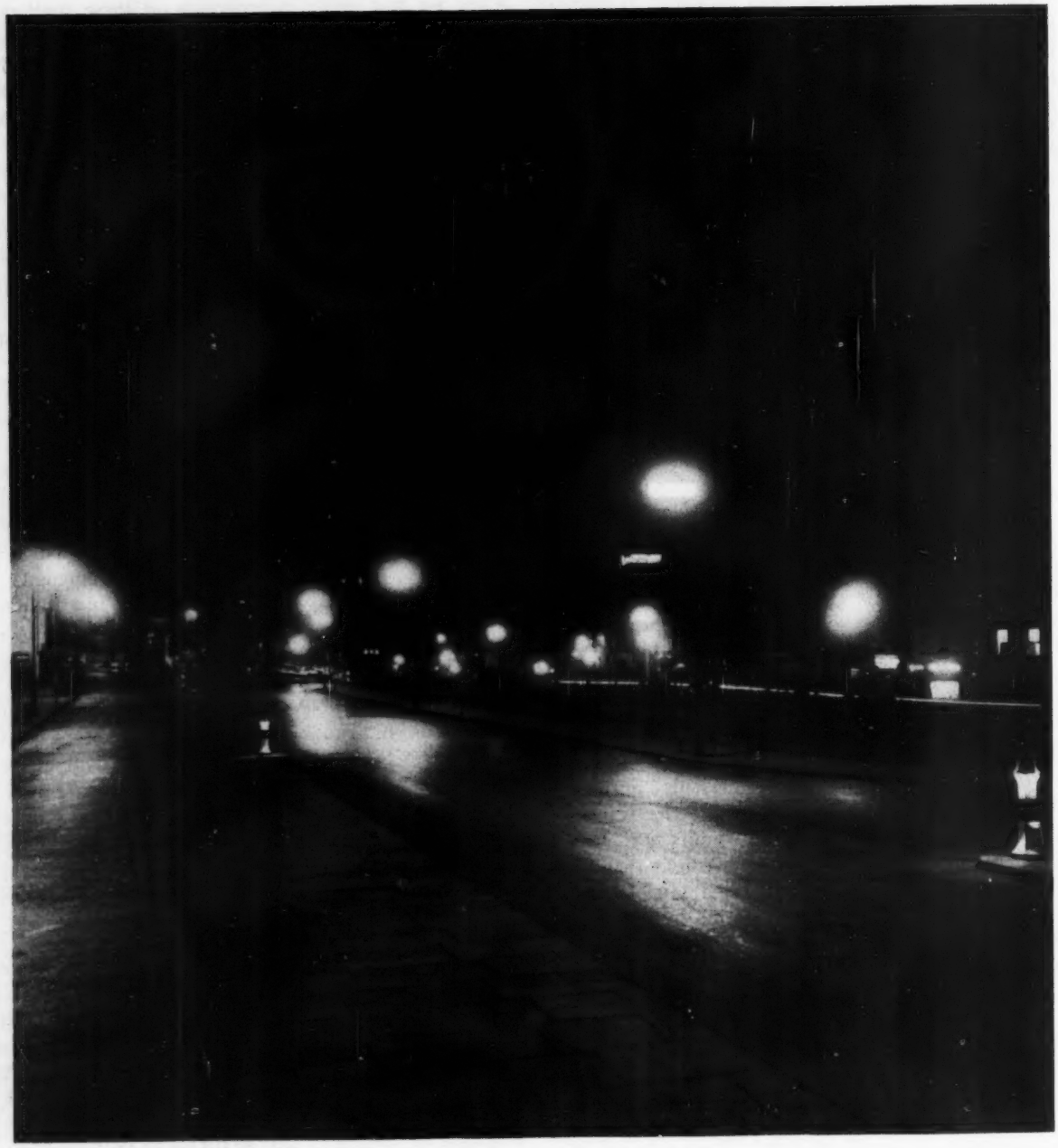
The first number of a new international journal in the field of optics, entitled " Optica Acta," has recently appeared. It is intended that this journal shall fill for Europe the rôle which the Journal of the Optical Society of America plays on the other side of the Atlantic.

The control of the journal is vested in a board of thirteen members from different European countries and there are three editors, one for each of the languages (English, French and German) in which articles will be printed. The English editor is Dr. C. G. Wynne and the Secretary of the Board of Control is Dr. W. S. Stiles. Each article will be accompanied by summaries in all three languages. The field proposed to be covered includes, in addition to optical theory and optical instruments, photometry, colorimetry, physiological optics, light sources, optical materials and physical detectors of light.

Parts will be published, not at fixed intervals, but as material is available, and they will not be sold separately. Subscriptions will be for a volume of some 200 pages at a price of 3,500 French francs. The publishing house is the Société de la Revue d'Optique. Intending subscribers in this country should write to the Assistant Secretary, The Royal Society, Burlington House, W.1. It is interesting to note that the first part contains an article by Dr. W. S. Stiles and M. Aguilar (of Madrid) on the rod mechanism of the retina at high levels of stimulation.

Round the Towns

The first article in this issue is what we hope will be the first of a series, not necessarily appearing at regular intervals, in which we intend to draw the attention of readers to developments in lighting practice in different towns. From time to time we give details of interesting installations (and we shall continue to do so), but such individual examples, though indicating modern trends, are not necessarily typical of everyday practice. There is a lot of good lighting work done which receives little notice, and we hope to find it.



Bristol City Centre

Round the Towns—(1)

BRISTOL

Avonmouth Docks.

Founded in mediaeval days as a seaport several miles from the open sea where the River Frome joins the Avon, Bristol developed down the ages, firstly as a port and secondly as an industrial centre where ships brought the produce of distant lands to the very doorstep of the merchant and manufacturer.

The docks are still the mainstay of the city's prosperity, although nowadays the bowsprits of ocean-going sailing ships no longer project over the busy streets. Far-sighted Bristolians in the mid-nineteenth century anticipated that the development of the steamship and railway called for a port where there would be less congestion than is inevitable in the heart of a city and where ships larger than any which could navigate the Avon could be berthed. Waste land on the right bank of the river-mouth was chosen as the site of the new Port of Bristol, the name Avonmouth being given to it, and it is here that the bulk of ocean traffic is now handled.

One of the port's many interesting activities is the export of motor vehicles which arrive from the Midland factories under their own power, on lorries or by train, completely assembled with a protecting skin of "dope" over plated parts or packed in cases. The work of loading proceeds all round the clock and floodlighting has been installed to make the task easier. A photograph of "X" Berth is shown (Fig. 1) where cased vehicles as well as fully assembled ones are seen. Floodlights using 140-watt sodium lamps are mounted on 25-ft. concrete columns around the outer boundary of the parking space, and each crane has two 500-watt floodlights mounted on the roof of the control cab (see Fig. 2) enabling the crane driver to see his load from the moment of hitching until it disappears into the ship's hold. Fig. 3 shows "T" Berth where four 500-watt dispersive reflectors below the turn-table platform of each crane, about 35 ft. above ground, provide very good lighting at the quayside.

Modern methods of goods handling in the Port Authority's warehouses have necessitated alterations to the lighting installations for a reason other than the consideration of light distribution. Fork lift trucks are now used for stacking goods, and with them it is possible to stack higher than was practicable when manual labour was employed for this purpose, thereby permitting the storage of a greater bulk of merchandise on a given floor area. It was found, however, that the luminaires were being damaged by being struck by cases lifted high above the truck-driver's head where it was not possible for him to see whether his load was about to hit a reflector. In sheds where there is an open roof the reflectors are now suspended between the roof trusses and above the level of the tie members so that stacking can be done up to this height without coming into contact with the luminaire; as an additional safeguard they are now hung on chains instead of on conduit drops, so that if they are struck they will sustain only slight damage, being free to swing.

The lighting in multi-storey warehouses is now provided by angle reflectors tucked into the angle between ceilings and walls or at the sides of cross girders out of harm's way. This arrangement has been found to be quite satisfactory in every way and can be recommended. (See Fig. 4.)

Great quantities of wines have been imported into Bristol for hundreds of years and the casks are stored in many acres of cellars beneath the city streets. It is interesting to observe that bottling is still done by the light of candles—considered to be the only satisfactory illuminant for judging the colour of wines and sherries.

Much of the oil and motor spirit coming into the country is handled at Avonmouth Docks, where flameproof lighting equipment is, of course, much in evidence. It is quite usual to pump oil through half a mile of pipes from the ship to the storage tanks and the need for precaution in the presence of millions of gallons of inflammable spirit is obvious.

At the quayside, flameproof fittings are imperative but the roadways are lighted by orthodox street-lighting fittings on steel columns. A number of new lamps recently installed are of side-entry bowl refractor-type, using 250-watt H.P.M.V. lamps with an internal reflector fitted

Fig. 1. Floodlighting at "X" berth, Avonmouth Docks.

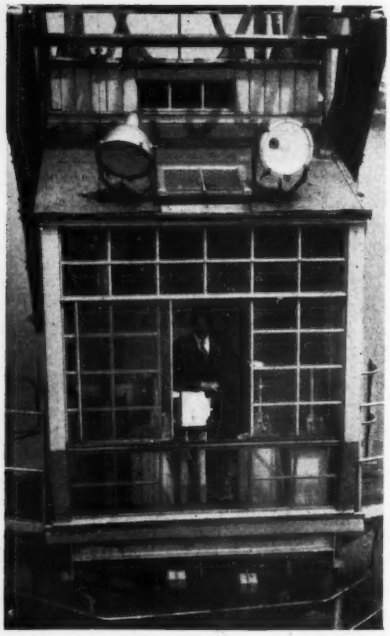


Fig. 2. Floodlights on one of the modern 3-ton electric cranes at Avonmouth Docks.

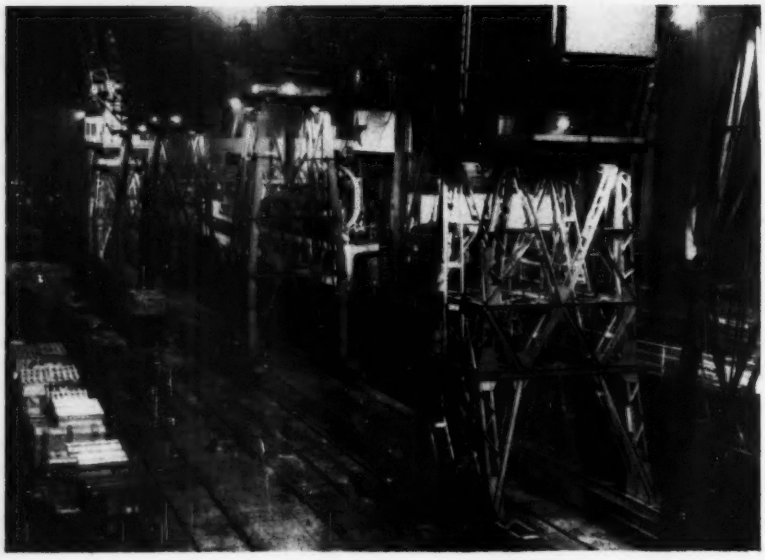


Fig. 3. Cranes at "T" berth showing lighting below turntable platforms.

to avoid wastage of light on the side away from the road and also to increase the illumination between the road and quayside, where the pipes are run above ground.

The storage tanks are isolated in compounds and all electrical equipment has to be of certified flameproof type. Loading of tank waggons for road and rail transport is carried out and a very good standard of lighting is maintained to facilitate gauging of the tanks with graduated dipsticks and for operating control valves on the intricate pipe system.

There are several flour and provender mills at Avonmouth to deal with imported grain and to handle very considerable quantities of corn grown in the West Country. A modern flour mill is really a gigantic machine enclosed in walls and roofed over, with push-button control operated by a surprisingly small number of operatives. Lighting is localised, being required for supervision and safe movement around the elaborate system of ducts and shutes. Prismatic bulkhead fittings are in the majority, although dustproof fluorescent fittings are employed here and there where a high standard of lighting is required for examination of samples and similar tasks.

An industrial estate of considerable extent is being developed on land adjoining the docks. The Imperial Smelting Corporation have an extensive site where smelting of zinc and the manufacture of sulphuric acid are carried on with phosphatic fertiliser production as an important by-product. The lighting on this undertaking embraces a large area of roads and railway sidings with supervisory lighting in and around the manufacturing plant. Very large quantities of ore, phosphates, superphosphates, etc., are handled, being brought from the quayside by an overhead cable system and carried by belt conveyors about the plant. Carbon black is now produced on the industrial estate by burning oil and collecting the carbon formed thereby. Here again the process is automatic and the lighting is supervisory in character.

A new locomotive shed is being completed by the Port of Bristol Authority for their own locomotives used on the Docks Estate. Overhead lighting is provided by cast light alloy dispersive fittings of a type specially made for locomotive sheds; these have a hinged glass visor and are of very robust construction to withstand the arduous conditions in a locomotive shed where smoke and sulphur fumes are present in large quantities. The running pits in the new shed are lined with glazed bricks and fluorescent lighting fittings are built into the sides of the pits in staggered formation. Diesel locomotives are now being introduced and will be housed in a separate part of the shed where conditions will be much cleaner, so that it will be possible to maintain a much higher degree of lighting efficiency.

Being built, like Rome, on seven hills, several of the notable buildings of the city stand out prominently and afford thereby excellent subjects for floodlighting. The City Engineer's Department possesses the necessary equipment for floodlighting on festive occasions buildings such as the University Tower and the Physics Department of the University, a castle-like edifice standing on the top of the hill known as the Royal Fort. On Brandon Hill, there is a tower known as the Cabot Tower, named after John Cabot, who sailed from Bristol and discovered the mainland of North America two years before Christopher Columbus set foot on it, as every local school child knows. (It is also held locally, by the way, that America was named after the Sheriff of Bristol at that time, whose name was Americke.) The Cabot Tower is permanently floodlighted, and in addition has four flashing lights at the top, installed a year or two ago, which spell out the name B.R.I.S.T.O.L. in Morse code to welcome the homecoming mariner and to tell air travellers that they are flying over the capital of the West Country.

The famous suspension bridge over the Avon Gorge has not yet been floodlit, but when required the towers and chains are outlined with 6,000 coloured lamps, which are kept in storage for the purpose.

Undoubtedly, the loveliest subject for floodlighting is the church of St. Mary Redcliff, which, having been

Fig. 4. Lighting in a Bristol Docks warehouse with angle reflectors.

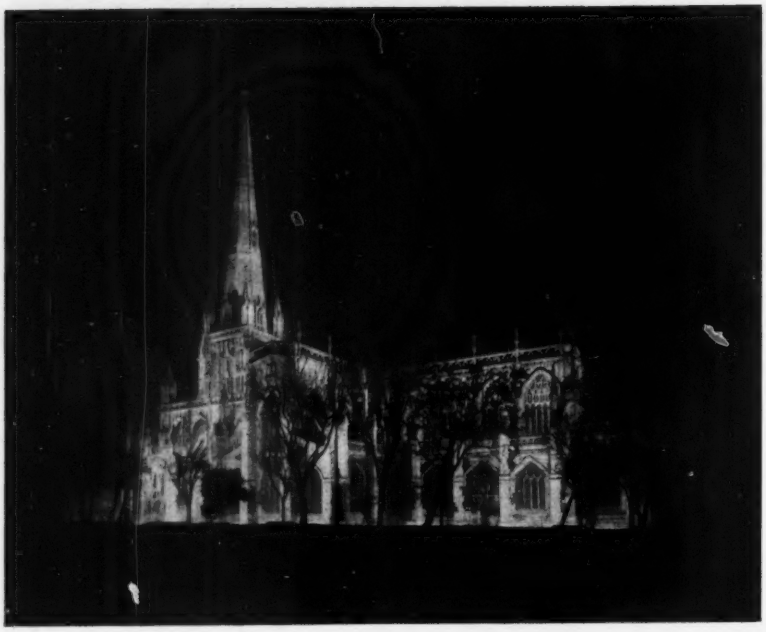


Fig. 5. St. Mary Redcliffe, Bristol.

completely rebuilt in the late fourteenth century by William Canynge, a local merchant-prince, is therefore harmonious in architectural style throughout. Since the war, it has been only partially floodlit, but a church such as this surely calls for full-scale treatment. Any Continental town possessing such a gem of architecture would undoubtedly install permanent floodlighting. Fig. 5 shows the church as floodlit on a pre-war occasion.

Electricity House, the headquarters of the South Western Electricity Board, was designed with floodlighting in mind, and the main front is permanently floodlit with sodium from first- to fourth-floor levels, with the fifth floor, which is set back to form a covered balcony, illuminated by red neon floodlights. The Service Centre in Electricity House occupies the ground floor with a

Fig. 6. Service floor at Colodense, Ltd. Aperture for luminaire serving floor below is between the two nearest ventilating ducts.

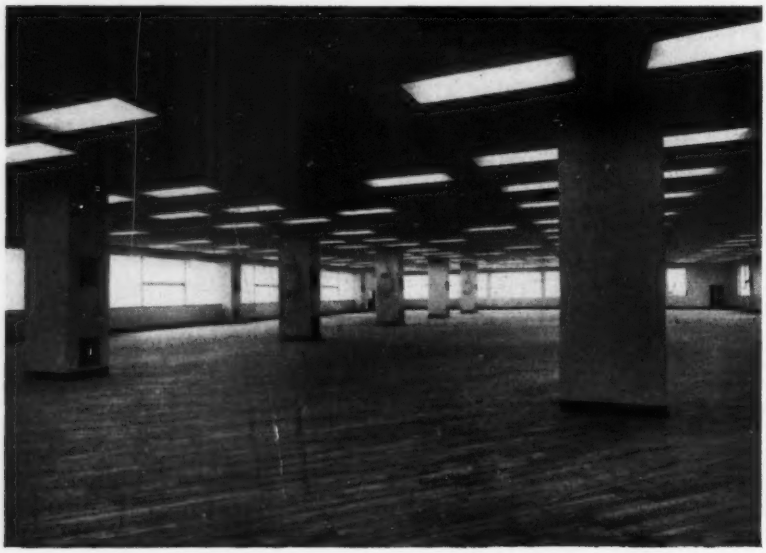


Fig. 7. Floor at Colodense, Ltd., before installation of machinery.

Figs. 8 and 9. Cigarette making room at W. D. and H. O. Wills.

lighting information bureau in the basement. General lighting in the Service Centre Showroom is provided by hot cathode fluorescent lamps in ceiling fittings of special design, having 8-ft. 125-watt lamps running lengthwise and 5-ft. 80-watt lamps on the transverse beams. Between each section of the fittings is a 150-watt internally silvered lamp-type fitting with "eyeball" adjustment to provide emphasis in the lighting of goods on display. The lighting of the Demonstration Theatre is very well arranged, being provided by hot cathode fluorescent lamps in cornices with filament-type spot lamps to give additional brightness to the stage. Variac dimmer control is arranged for the fluorescent lamps, which are of colour-matching type to avoid colour distortion affecting the appearance of food when cooking demonstrations are being given.

Everyone who has been to Bristol knows "The Centre," although no such place officially exists. Saint Augustine's Parade, Colston Avenue and Broad Quay, with the gardens laid out over the underground course of the River Frome which formed part of the Floating Harbour until it was covered over partly in the 1880s and partly in the late 1930s, is known to all and sundry as "The Centre," because in the days when there were trams in the streets this part of the town from which services radiated was indicated on the destination boards as "Tramways Centre"—and "Centre" it has been ever since. This is the Piccadilly Circus of the West, and fluorescent street lighting is now installed using 3 X 80-watt lanterns of standard design carried on steel columns. These were existing standards adapted *in situ.* removing 4 ft. or so above the bracket arms to give a balanced appearance. The new shopping area is to have fluorescent street lighting, and a small number of lanterns have already been installed.

Main traffic routes in the city are being relit with sodium lamps—a great improvement on the old system, parts of which had been in service for something like 35 years. On bus routes other than main traffic arteries, Group "B" lighting, also with sodium lamps, is being introduced, thereby benefiting bus drivers and other road users and making an important contribution to road safety.

The visitor to Bristol who arrives by train and who walks along Victoria Street to the old shopping centre of the city will see very little evidence of rebuilding after the widespread destruction left by enemy air raids over thirteen years ago and will no doubt wonder why this is so when other cities have restored a large proportion of their devastated areas. There are two main reasons for this. Firstly, a very large number of dwellings had to be restored and the need for new houses has demanded that priority in building operations should be given to providing homes. Secondly, the civic authorities recognised that the many large vacant spaces presented an opportunity for replanning the city so that from the initial tragedy there might arise a new Bristol of which future generations could be proud. Even before the war had ended much thought and discussion had taken place and the city was divided into zones where development could be controlled under the planning scheme.

What was formerly the site of the city's popular shops and stores will, in course of time, become a civic centre with public buildings and parks, the new shopping area occupying ground to the north of the old location. The

building of this new shopping centre has now begun and Broadmead and its vicinity is now the scene of much activity with some of the new stores already opened and flourishing. Noteworthy among them are Woolworth's and Marks and Spencer's new premises on opposite sides of Broadmead and both extending through to the street at the rear. Woolworth's store is approximately 350 ft. in depth and lighted with quadruple continuous lines of 4-ft. fluorescent lamps suspended from the ceiling, an impressive array of about 500 lamps being visible on entering at either end of the store, giving an immediate sensation of the great length of the shop. Marks and Spencer's lighting employs louvred-type pendant fittings with four 5-ft. fluorescent lamps to each.

In other new shops the lighting is largely fluorescent of orthodox character with occasional use of the internally silvered filament lamp in recessed louvred fittings. One is pleased to see that in hotels, restaurants and other places of refreshment the easing of restrictions with its resultant increase in the number of schemes of modernisation and redecoration has brought about several noteworthy improvements in lighting with the competitive element playing its useful part in stimulating action with beneficial results to the social life of the city.

Colodense, Ltd., have built a new factory at Bedminster where the processes of conversion of cellulose film entail the use of inflammable solvents which would have necessitated flameproof luminaires being employed if an orthodox installation had been introduced. This has been avoided, however, by providing lighting through glazed panels in the ceiling. Above each main floor there is a service floor containing ventilating ducts and other auxiliaries with floor traps giving access to the fluorescent luminaires serving the room below (see Figs. 6 and 7). These fittings are a simple type of twin 5-ft. channel unit fixed to a suitable metal tray; the openings into which they are lowered have a matt white interior finish. The resulting illumination is very evenly distributed and an average of 20 lm./ft². is obtained. One advantage of this system of lighting is that maintenance can be undertaken without any disturbance to the operation of the factory.

Messrs. W. D. and H. O. Wills' engineering department has recently re-lit some of the offices and manufacturing rooms at their Bedminster tobacco factory, employing a trunking system in which control gear is housed in the trunking and reflectors or "Perspex" diffusing fittings are attached to the underside, making a neat and efficient installation producing an average illumination of between 20 and 30 lm./ft². in offices and workrooms.

Correspondence

Apparent Brightness

To the Editor, LIGHT AND LIGHTING

Dear Sir,—Readers of "Lumeritas" are almost certainly more numerous than readers of the Transactions, so it is likely that most members of the I.E.S. have become acquainted with the concept of "apparent brightness" from the paragraph on page 96 of the March issue of *Light and Lighting*. If anyone is tempted to know more, I would advocate that they read Chapter X, Brightness Perception, of the book by R. M. Evans called "An Introduction to Colour" (Chapman and Hall, 1948). This gives quite the best summary of the problem that I have read. It suffers from a defect that some consider characteristic of American publications, in that there is an almost complete unawareness of any work done in any country other than the United States and Germany. Apart from this, the problem of apparent brightness is stated clearly and in simple terms.

Data on apparent brightness have been in use for many years in the study of war-time visual problems and more lately in the lighting of buildings, and a fair amount of experience has been accumulated on the value of this approach. In our work at the Building Research Station it has been found that such a concept is of great value for the general appraisal of an installation, but not for a high degree of precision of design. So many factors enter into the judgment of apparent brightness, such as the relative sizes of the areas in the visual field, their relative positions, the effects of brightness constancy and simultaneous contrast. But once experience has taught the situations in which direct application of the apparent brightness data is valid, and in which not, there is no doubt that the concept of apparent brightness is a valuable tool, and that it will become more so as design techniques are developed.

"Lumeritas" rightly gives honour due to Mr. A. W. Beuttell in his note, but omits the names of Goldberg and Marcel Abribat, from whose work on true photographic reproduction many of the current concepts are derived. In addition to the work of Craik, stimulated by Beuttell, there is that of Pitt (Proc. Phys. Soc. 51, 810 (1929)) which is extensive, and which, in spite of his use of a binocular matching technique, gives data in general agreement with other studies employing direct vision by the two eyes, such as we have used at B.R.S.—Yours, etc.,

Building Research Station, Garston. R. G. HOPKINSON.

The Design of Lighting Fittings

Report on a discussion opened by an industrial designer, an architect, an electrical contractor, and a lighting fittings designer.

A meeting of the Illuminating Engineering Society, held at the Lighting Service Bureau on January 26 to discuss the design of lighting fittings, attracted a very large audience, and the lecture room was full when Dr. W. E. Harper, a Vice-President of the Society, took the chair. On the platform to open the discussion were Mr. Mischa Black, the decorative artist well known for his work in connection with the Festival of Britain; Mr. J. Mortimer Hawkins; Mr. G. Grenfell Baines, who spoke from the point of view of the architect, and Mr. D. W. Durrant.

Mr. Mischa Black spoke first and, to the surprise of many in the audience, expressed a warm appreciation of the great improvements in the design of fittings which had taken place during the last few years. It was now possible, he said, for the architect to find something which really satisfied him and this to such an extent that, certainly in the domestic field and probably also in the industrial field, there was little need for much modification in the immediate future. He urged fittings makers to call a halt to the endless duplication that was going on, the production of minor variations on a common theme. There were, he said, more than enough new types, and what was urgently needed was greater refinement, the aesthetic refinement of form, colour, and finish. Instead of producing more new types, designers should concentrate on improving those types already in existence.

Mr. Mortimer Hawkins spoke from the point of view of the electrical contractor and emphasised that to him ease of maintenance was a very vital matter. With tungsten lamps maintenance was fairly simple, but with fluorescent lamps matters were very different. When a lamp was giving trouble there might be several causes, and the speaker gave a heart-rending account of what could easily happen with fittings designed as they often were at present. "Believe it or not," said Mr. Hawkins, "but even to-day some fittings are designed in such a way that it is impossible to renew the starter without removing the lamp," and he painted a semi-humorous, semi-reproachful picture of the number of journeys up and down a ladder which might be necessary in order to remedy a simple fault. This was not only exasperating to the contractor but expensive to the owner who, not unnaturally, came to the conclusion that the contractor was an incompetent bungler—"a criticism," said Mr. Hawkins, "which was probably justified, but certainly misplaced."

He then went on to make specific criticisms of certain features of modern fittings. Where fluorescent lamps were mounted in continuous lines, the appearance of the installation was greatly affected by the accuracy of the alignment, and if only the fittings designer would provide slots instead of holes for fixing, life would be much simpler. Then, said Mr. Hawkins, there was no standardisation at all in the distances between fixing holes, and he gave a list of the various distances adopted by different makers. Bi-pin holders, he said, should be mounted in slotted fixing holes so as to enable small variation in the lengths of lamps to be accommodated easily. The canister of the starter switch should be marked clearly with the function it was designed for, not with a catalogue number. And why, asked Mr. Hawkins, was the tapped choke now practically entirely superseded by the untapped choke?

Turning to the fittings themselves, Mr. Hawkins referred to plastic fittings with prismatic elements which were very hard to clean, and he asked why the prisms were not on the outside, where they could be got at more easily. With regard to fittings in general, he expressed a strong preference for those which allowed dust and insects to drop out instead of accumulating and having to be removed from time to time by a cleaner.

The next speaker was Mr. Durrant who, at short notice, took the place of Mr. L. A. Phillips, unable to be present owing to illness. Putting the point of view of the fittings designer, Mr. Durrant said that this unfortunate individual had to be a combination of mind-reader and prophet. He had to design his fittings to produce a certain environmental condition which would satisfy the user, although the latter seldom knew himself what it was that he wanted. He had to cater for a vast variety of tastes and requirements and at the same time he had always to bear in mind vital economic considerations. One of the greatest bugbears of the fittings designer was the inevitable temperature rise in operation, and this necessitated an extensive programme of testing. Corrosion,

The term "lighting fitting" is used here as the meeting was so announced.

too, was a serious problem which had to be dealt with and which again called for testing on an elaborate scale.

Mr. Grenfell Baines then criticised manufacturers and, in fact, engineers generally, for their exclusive preoccupation, not only with fittings as fittings but, worse still, with the purely functional aspect of fittings design. Good design, he said, consisted in achieving a satisfactory equilibrium of all aspects, without undue emphasis on any one; it was necessary to get above the purely functional aspect. Looking ahead, the speaker foresaw that the present trend in building design might well influence fittings design. The trend to which he referred was largely brought about by shortages; the rooms in buildings were lower than they used to be and there was an evident desire to get more out of less space. The linear source, said Mr. Baines, could be absorbed in the fabric; in a sense, the whole room could become a lighting fitting and the architect required designs that would fit into his general scheme. The fittings designer should collaborate with the architect, and to this end he should have some architectural training. Mr. Baines then referred to an attractive scheme of suspended fittings in which the conductor had been divorced from the suspension. He concluded with a plea that manufacturers should give in their catalogues a picture of the light pattern which a fitting produced on a surface illuminated by it. This, he said, would help the architect much more than the conventional polar curve.

The general discussion was opened by Mr. D. S. Allom, who emphasised that price was a very great consideration. This affected both the designer and the contractor who were faced always with the competition of someone whose main object was to produce more cheaply. He endorsed most strongly what had so often been urged, viz., that the illuminating engineer and the architect should get together at the very earliest stages in the design of a building; only in this way was it possible to evolve really good special purpose fittings.

In reply to the next speaker, who said that it was impossible to call a halt in the design of new fittings and that, even if it were possible, this would impede progress, Mr. Mischa Black said that what he had condemned was the present fantastic search for novelty. The aim should rather be to evolve a fitting of outstanding excellence.

Taking up Mr. Allom's point, another speaker said that the architect should show more inclination to collaborate with the illuminating engineer. The engineer was only too keen to collaborate with the architect, but so often he did not get a chance. Adding that the architect would not seek the co-operation of the lighting engineer unless he himself understood more about lighting, the speaker referred to a very successful course run by a fittings manufacturer for students of architecture.

A fittings designer in the audience said that he disagreed with the statement that it was desirable for an architect to give the finishing touches to a design for a lighting fitting. He laid down three rules for designing a fitting, viz. (a) state the function which the fitting was intended to perform, (b) decide what materials and manufacturing techniques were to be used, and (c) bring to the problem the outlook acquired by one's experience of life. Only in this way could a really satisfactory result be achieved. Agreeing in general, Mr. Mischa Black said that under modern conditions the craftsman and the technician were becoming more and more divorced from the artist.

Other speakers took up the theme of collaboration between architect and lighting engineer and some illustrative anecdotes enlivened the proceedings and at the same time served to emphasise the points that had been made. The suggestion to adopt the term "luminaire" brought from Mr. Grenfell Baines a strong plea for the avoidance of technical jargon. He urged lighting engineers to express themselves in straightforward and simple language. In reply to a question as to what architects were doing to train the lighting engineer, he said that many architects gave up much of their time to lecturing and that elementary classes on architecture were available to all comers.

Mr. Durrant then followed with a plea to the architects to explain exactly what results they wanted to achieve with any particular lighting scheme. He said that if this were done the designer would produce what was required, and he showed, by means of slides, the way in which a well-defined aim had been successfully achieved in a given case. The most important person, said Mr. Durrant, was neither the architect nor the illuminating engineer : it was the user.

Mr. A. G. Penny addressed himself to those who had insisted on the importance of the artist's opinion. As far as he could judge, no one could tell whether a particular artist's opinion was valuable or not until that artist had been dead for some 50 or 100 years, and it was therefore a matter of some difficulty to know whose opinions to follow while they were still alive.

Mr. J. M. Waldram pointed out that fittings fell naturally into two main classes. There was the fitting made to suit a particular customer with a particular problem in mind and there was the fitting which formed part of a manufacturer's regular production and which was designed to meet the requirements of a large number of individuals with varying tastes and varying needs. He felt that a bridge was gradually being built between the architect and the illuminating engineer; if both parties had a common purpose, a unified result would be obtained, but not otherwise.

Other speakers pleaded for better design of the entries for conductors, so that destructive and dangerous abrasion was avoided, and for fittings that would be easier, and therefore cheaper, to instal. It was pointed out that the cost of fittings was generally not included in the cost of a building, and this frequently led the client to economise on fittings in a way that completely destroyed the harmony between the lighting scheme and the building.

The last speaker in the general discussion was Mr. A. H. Young, who emphasised that fittings design was, or should be, the result of team work. The four opening speakers then made brief comments on those points which they had not already dealt with. In particular Mr. Mischa Black said that it was most important to get away from the desire to make things cheaper and cheaper, while Mr. Durrant said that the biggest single step forward that could be taken would be the encouragement of the discriminating buyer. The more important he became the greater would be the incentive to the designer to produce better fittings.

The meeting concluded with appreciation to the openers, expressed by Dr. Harper and enthusiastically endorsed by all those present.

Lighting Installation

A Spray Painting Booth

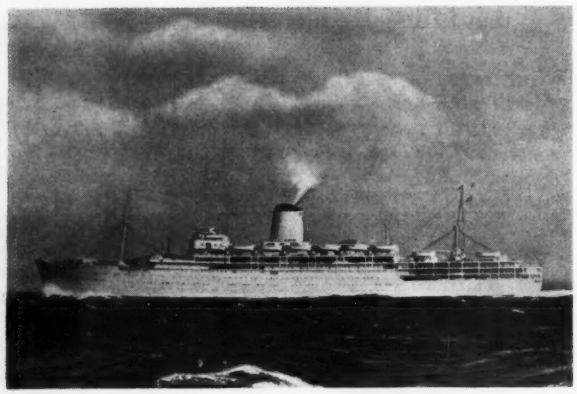
Planned to handle a flow of commercial vehicles of various sizes a new spray painting department is now in operation at the works of Transport Equipment (Thornycroft) Ltd., at Basingstoke. The equipment comprises a spray-booth 45 ft. long, 15 ft. wide and 13 ft. 6 in. high together with a make-up air supply plant and separate space heating plant.

Owing to the size and weight of the vehicles which have to pass through this plant (including the "Mighty Antar," which has a total unladen weight of 15 tons and an overall height of 11 ft. 6 in., width 10 ft. 6 in., length 32 ft. 6 in.) the booth has a pit 25 ft. long for underchassis work. To accommodate short-wheel base vehicles, the pit can be bridged or partially covered by means of movable sections of open steel flooring. The pit is equipped with six flameproof fluorescent luminaires.

General lighting for the booth is provided by means of 12 industrial trough fluorescent luminaires fitted behind glazed panels. All motors and lighting equipment are certified flameproof. The full electrical load for the booth is 73 kw. All the lamps used in the booth are of "daylight" colour.

Installation designed by: Modernair (Processes) Ltd.
Lighting equipment supplied by: The Edison Swan Electric Co., Ltd.

Two New British Built Liners



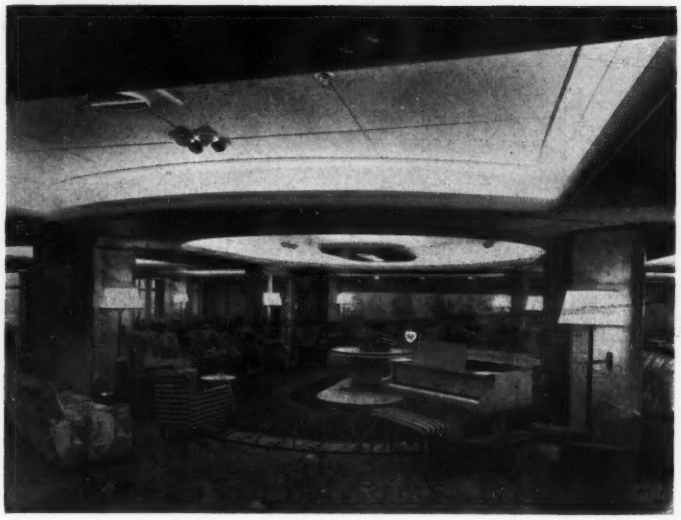
S.S. Arcadia

The new 29,734-ton P. and O. liner *Arcadia* sailed from Tilbury on her maiden voyage to Australia on February 22.

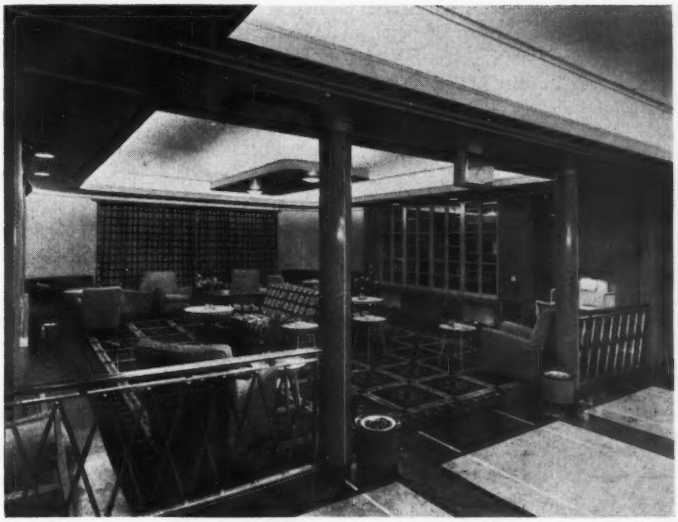
In this ship the architect, J. Patrick McBride, of McInnes, Gardner and Partners, has used indirect cornice lighting on an extensive scale. The system is adopted as a decorative feature in conjunction with tungsten lighting in most of the spaces. In four of these, the first class lounge, first class library, first class dance space and tourist class dance space, double rows of ivory and gold colour cold cathode tubes are installed. Elsewhere the cornice lighting is by means of 4-ft. and 2-ft. hot cathode tubes. The fluorescent lighting is operated on a 230-v., 50-cycle A.C. supply.

In the first class lounge in addition to the cornice

First Class Dining Saloon.



First Class Lounge.



First Class Library.

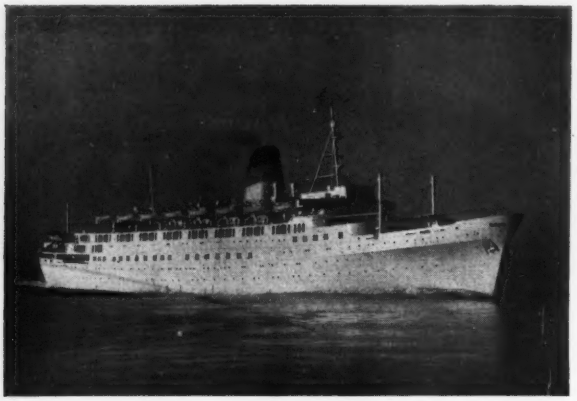
lighting cold cathode tubing is installed above a laylight. A motor-operated dimmer has been supplied for the cold cathode lighting in the first class dance space. The sequence of operation is first to extinguish the gold tubes and then to dim the ivory tubes to a fairly low level.

Transformers for operating the cold cathode tubes are concealed between the false ceilings and the deckheads. A feature of these transformers is that the high-voltage and low-voltage terminals are at the sides of the casing so as to be accessible without lifting off the main cover, and consequently less free space has to be left above the transformers when installed.

A special effort was made by the architect when planning the installation to use straight cold cathode tubes wherever possible and to minimise the number of different lengths required.

About 1,000 special channel fittings were supplied for the 2-ft. 20-watt and 4-ft. 40-watt hot cathode tubes used for cornice lighting. The tubes extend beyond each end of their gear channels and are offset from their centre line, so that while the channels can be installed in one straight line, with economy in the width of cornice required, the tubes can be arranged with their ends overlapping by reversing adjacent fittings, so that the lighting effect is continuous. Brick gear is used throughout.

Some twenty-five special designs of tungsten lighting fittings were prepared for the scheme by the architect. They include desk lamps and floor standards as well as ceiling fittings and are restrained in decorative treatment. Metalwork is mostly chrome or bronze, and the glazing is with clear or obscured uncoloured glass. A decorative fluorescent fitting has been designed for the first class hairdressing saloon and shop, accommodating two 2-ft. 40-watt tubes enclosed by a reeded "Perspex" bend and matt chrome end caps. Large quantities of lamps were supplied for tungsten lighting throughout the ship. The lamps and lighting equipment in the *Arcadia* were supplied by the General Electric Co., Ltd.



T.S.S. Olympia

The T.S.S. *Olympia*, which recently went into service for Greek Lines on the transatlantic run, is mainly designed to provide tourist passengers with the luxury formerly associated only with first class and cabin class accommodation. Of 23,800 tons displacement she carries 138 first class passengers besides 1,150 tourist passengers. Of the 21 public rooms 14 are devoted to the tourist class travellers and, of course, are individually more spacious than similar areas in the first-class accommodation.

A uniform design of electric lighting fittings throughout the ship was the basic conception, the emphasis being on recessed circular fittings with concentric louvres at the ceiling level. These were made in six sizes, having diameters ranging from 6 in. to 4 ft. 7 in., accommodating from one to 17 60-watt tungsten lamps, according to size and the requirements of the lighting scheme. Other types

Tourist Dining Saloon.

First Class Dining Saloon.

were similarly louvred but were made rectangular in shape ranging from four to 12 sq. ft. in area. All these fittings were constructed of angle and sheet steel, anti-rust treated before stove enamelling.

Most of the lighting fittings as described were manufactured by Falk, Stadelmann and Co., Ltd., to designs initiated by the decorative architect, J. P. McBride, of McInnes, Gardner and Partners, and with the decorative contractors, Frederick Sage and Co., Ltd., Hampton and Sons, Ltd., Waring and Gillow, Ltd., and White Allom, Ltd. Some 1,200 fittings were manufactured and supplied by Falk, Stadelmann and were fabricated from start to finish in the very short time of three months.

A large number of special indirect wall brackets of bronze were also supplied to give supplementary lighting down the sides and in the corners of the large rooms, and to give emphasis over the counters of banks, shops and similar areas.

The outstanding example of modern lighting on this ship is to be seen in the tourist class dining saloon, where some 2,000 sq. ft. of continuous louvred panelling was fitted flush with the ceiling and 40-watt tungsten lamps placed at 9-in. centres above it in specially formed recesses. The resultant effect was one of low-brightness luminous panels from which a high intensity of evenly diffused illumination was obtained. This lighting was supplemented by 42 indirect wall brackets designed in a three-tier formation with pierced star decoration.

Specially designed hanging lanthorns and lantern-type wall brackets are featured in the smaller public rooms.

Lighting Abstracts

OPTICS AND PHOTOMETRY 612.843.367

38. Comparative analysis of "comfort" and "glare."

D. E. SPENCER. *Illum. Engng.* **49,** 39-45. (*January,* 1954.)

A number of recent researches on glare and visual comfort are criticised because, the author claims, a fixed line of sight has been considered, the instantaneous state of adaptation of the eye has been neglected and "glare" has been subdivided into "discomfort," "disability," "direct" and "reflected" glare. These researches include Harrison and Meaker's glare ratings, Luckiesh and Guth's "BCD" technique, Petherbridge and Hopkinson's model-scale studies and Logan's zonal flux method. The 3 : 1 adaptation ratio advocated by the Q and Q Committee is considered to meet the criticisms of the other methods of specifying brightness quality numerically. P. P.

39. Multichromatic colorimeters. 535.65

J. COHEN. *Illum. Engng.* **49,** 50-58. (*January,* 1954.)

Describes a colorimeter in which the test and comparison fields can be given any desired spectral compositions by removing unwanted spectral components with opaque templates interposed in the spectra of the colorimeter light sources. The first-order spectra from transmission diffraction gratings are used and, after modification, are recombined by reflection in spherical mirrors. The two fields are juxtaposed semi-circles and are viewed against a surround comprising the interior of a sphere whose colour can be varied. P. P.

40. The orientation reflex. 612.843.3

H. L. LOGAN. *Illum. Engng.* **49,** 19-28 (*January,* 1954.)

The awareness of one's position and rate of movement with respect to other objects (objective orientation) is largely a function of the visual processes, and hence is dependent on the presence of light. Unless this light is properly provided, environmental hazards will fail to stimulate the orientation reflex and accidents will result. Situations in which the visual clues to hazards are inadequate or misleading are discussed. P. P.

41. A continuous daylight recorder. 535.24

W. H. BILLHARTZ, H. F. KINGSBURY AND R. W. MCKINLEY. *Illum. Engng.* **49,** 2-4. (*January,* 1954.)

Describes an apparatus for obtaining continuous records of the daylight illumination on a horizontal surface and on vertical surfaces orientated in each of the four cardinal directions. Rectifier photocells are mounted on each of five faces of the box, and are connected to microammeters whose dials are periodically photographed with a cine-camera. The photocells are cosine and colour corrected and the temperature of the box is thermostatically controlled. An artificial non-reflecting horizon is provided to eliminate variable ground conditions. P. P.

LAMPS AND FITTINGS 621.327.4

42. Mercury lamp starting requirements for outdoor applications.

A. E. BINDER. *Illum. Engng.,* **49,** 32-36 (*January,* 1954).

Curves are given showing the statistical variations of the starting voltages of four types of mercury vapour lamp with ambient temperature. The results have been related to records of the minimum temperatures likely to be experienced in practice, in order that minimum voltages for all-the-year-round starting can be specified. There was evidence that in actual installations the lamps started better than was indicated by the laboratory measurements. P. P.

43. Dimming hot cathode fluorescent lamps. 621.327.43

J. H. CAMPBELL, H. E. SCHULTZ AND W. H. ABBOTT. *Illum. Engng.* **49,** 7-12. (*January,* 1954.)

Describes the theory and operation of a circuit whereby a number (35 or less) of 40-watt fluorescent lamps can be dimmed over a brightness range of up to 250 to 1. A pair of thyratrons is used to initiate the discharge of the lamps while the brightness of the lamps is governed by the proportion of each cycle during which the discharge is maintained. The circuit comprises an electronic control unit housing the thyratrons, a separate brightness selector unit and the lamps with their ballasts. P. P.

LIGHTING 628.92

44. The "Reflected Component" in Daylighting Design.

A. DRESLER. *Trans. Illum. Eng. Soc. (London),* **19,** 50-60 (*No.* 2, 1954).

This paper reviews attempts made to rationalise and simplify the estimation of daylight factor in interiors allowing for internal reflections. Formulae for calculating reflected daylight are given and the close agreement between values computed from these with values derived from model measurements is noted. A recently evolved "Lumen" method of daylighting design analogous to that used for artificial lighting is described and it is concluded that the stage has almost been reached where daylighting design can be put on an equivalent footing to artificial lighting design. W. R.

45. Hospital lighting with fluorescent lamps. 628.972

D. FISCHER. *Lichttechnik,* **6,** 45-49 (*February,* 1954). *In German.*

Describes the lighting of a newly-built hospital near Hamburg, in which fluorescent lamps are used throughout. Even in the operating theatre these lamps provide high intensity general lighting, the fittings used being dust and water proof. Special fittings are used for ward lighting. One is placed over each bed head, about 5 ft. 6 in. above the floor. It houses two fluorescent tubular lamps and has an upper translucent strip window so that light is emitted towards the ceiling. In the lower side there is another longitudinal window with an adjustable visor. When the visor is open, direct light is available to the patient for reading, etc., but no bright surface is visible to a patient on the opposite side of the ward. Figures of illumination, and photographs of the various fittings used in different parts of the hospital are given. J. W. T. W.

628.972

46. Illumination values for general and localised lighting.

R. G. WEIGEL. *Lichttechnik,* **6,** 50-52 (*February,* 1954). *In German.*

The sensitivity of the eye to differences of luminance is reduced if the surrounds are either much darker or much brighter than the test field. For other visual sensitivities, such as visual acuity, the same kind of relationship may not hold. In the case of visual acuity, the lowest illumination at which a given task can be performed is related to the luminance to which the eye is adapted. On the evidence available it is clear that a good general illumination is always desirable. The author points out that it is now easy to provide generally values of illumination which formerly were only possible over small areas. J. W. T. W.

Reflected Daylight in Courts and Streets

By GUNNAR PLEIJEL*

In two previous papers ([1], [2]) a method for the computation of reflected daylight has been described, based on infinite series. The façades and the ground area were divided into elements of equal area and the direct daylight factor at the midpoint of every element was computed. After the first reflection the light had no special direction and so the mean value of the reflection factor of the court surface was used when considering the subsequent multiple reflections. The general formula for the reflected daylight factor then became:—

$$r\delta = \frac{\sum_{n} d\delta_\nu \cdot \rho_\nu}{n(1 - m\rho)}$$

where $r\delta$ = reflected daylight factor
n = the number of surface elements
$d\delta$ = direct daylight factor of the element
ρ_ν = reflection factor of the element ν
$m\rho$ = mean value of ρ

In calculating $m\rho$ it should be noted that the "roof" of the court or street has zero reflection factor. It is then assumed that the reflected light is uniformly distributed over the entire area of the court or street. This, of course, is not exactly true, but it has been shown by experiments on models ([3]) that the distribution is very nearly uniform. In what follows the values calculated from the formula will be compared with results obtained in the experiments ([3]) for courts and streets with various dimensions.

First the formula is applied to a court and a street. The reflection factors of the façades are assumed to be the same. The following formula is obtained:—

$$r\delta = \frac{F_f \cdot \rho_f + F_g \cdot \rho_g}{2 - \rho_g + f/g\,(1 - \rho_f)}$$

where $r\delta$ = reflected daylight factor
F_f = that part of the luminous flux entering the court or street that falls on the façades.
F_g = that part of the luminous flux entering the court or street that falls on the ground.
$F_f + F_g = 1$
f = façade area.
g = ground area.
ρ_f = the reflection factor of the façades.
ρ_g = the reflection factor of the ground.

To simplify the use of this formula, an examination

* Royal Inst. of Technology, Stockholm.

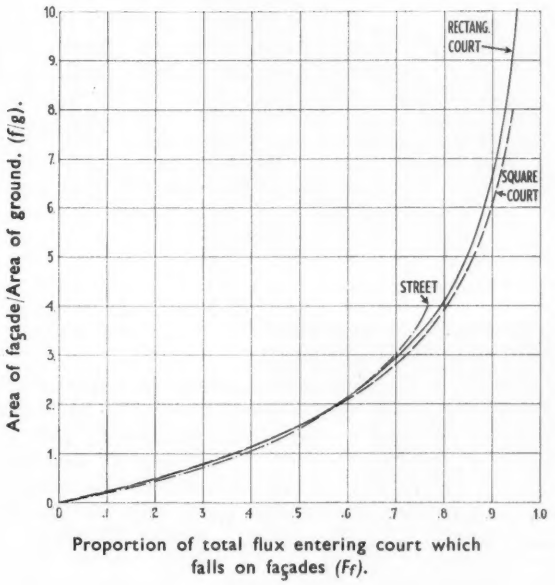


Fig. 1. *Relation between f/g and F_f for three cases.*

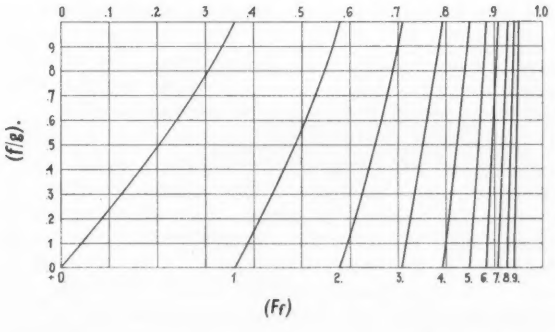


Fig. 2. *Curve (A) of Fig.* 1 *drawn to expanded scale of f/g.*

	Façade Reflec. Factor (ρf)	Façade height							
		20 m.		15 m.		10 m.		5 m.	
		exp.	cal.	exp.	cal.	exp.	cal.	exp.	cal.
Court 40 x 20 m.	0.20	4.9	4.8	5.9	5.5	6.9	6.7	9.0	8.4
	0.35	8.4	8.2	9.0	9.0	10.5	9.9	10.5	10.6
	0.58	14.3	15.4	15.1	15.8	14.7	15.9	13.5	14.6
	0.84	24.5	28.7	24.3	27.6	22.8	25.2	17.5	20.0
Court 26 x 20 m.	0.20	3.9	4.3	5.3	5.1	6.2	6.2	8.2	8.0
	0.35	7.4	7.7	8.0	8.5	9.3	9.5	10.0	10.5
	0.58	13.4	14.8	13.2	15.5	13.7	15.9	12.7	15.1
	0.84	23.2	28.9	22.4	28.2	20.9	26.3	16.2	21.6
Court 20 x 20 m.	0.20	4.0	4.0	5.0	4.8	6.3	5.9	8.5	7.7
	0.35	7.6	7.2	8.5	8.2	9.9	9.3	9.5	10.4
	0.58	14.1	14.4	15.4	15.4	14.7	15.9	13.5	15.3
	0.84	27.3	28.9	26.0	28.7	23.6	26.9	18.5	22.3
Court 13 x 20 m.	0.20	3.8	3.4	4.5	4.1	5.5	5.2	7.7	7.1
	0.35	7.3	6.4	8.1	7.4	8.9	8.7	10.2	10.1
	0.58	13.5	13.3	14.5	14.6	14.9	15.7	13.7	15.8
	0.84	27.0	28.5	26.7	29.0	24.4	28.2	18.7	24.1
Street 20 m. wide	0.20	5.9	5.9	6.6	6.7	8.0	7.7	9.5	9.1
	0.35	9.3	9.3	9.5	9.9	10.1	10.4	10.5	10.9
	0.58	14.9	15.9	14.8	15.9	15.0	15.3	13.5	13.9
	0.84	22.1	26.9	22.0	25.2	20.3	22.3	17.0	17.7
Street 13 m. wide	0.20	4.6	4.7						
	0.35	8.2	8.1						
	0.58	14.2	15.3						
	0.84	24.9	27.9						

COMPARISON BETWEEN CALCULATED (CAL.) AND EXPERIMENTAL (EXP.) REFLECTED DAYLIGHT FACTORS.

was made of the connection between the shape of the court or street and the factors F_f and F_g. The deeper the court or street is, the greater becomes F_f and the smaller F_g. The expression F_f increases or decreases with f/g. If F_f and F_g are calculated for three cases, a square court, a rectangular court with the ground dimensions 1 : 0.6 and a street, a similar connection is found between F_f and f/g for different values of f/g. Fig. 1 shows three curves, one for each case, and it is seen that they are very similar. Taking the curve for the rectangular court as a mean curve for all cases of streets and courts the diagram in Fig. 2 is obtained which can now be used with the formula to arrive at a comparison with the results of the experiments on models ([3]).

From the original values obtained in the experiments it is possible to calculate the mean reflected daylight factor for the façades in 84 different cases. The reflection factor of the façades is given four values but the reflection factor of the ground is kept constant at 0.20.

In the table the experimental (exp.) and calculated (cal.) values are compared for all these cases. Some differences may be noted. The calculated values for $\rho_f = 0.84$ are everywhere higher than the experimental values. This is not necessarily attributable only to the formula. As has been pointed out ([2], [3]) the artificial sky used in the experiments did not follow the cosine law, so that the direct light reaching the façades was too low at the top of the court. Of course this necessarily influences also the reflected daylight, especially when the reflection factor of the façades is high or when the façades are low. This case, however, is not very important because a reflection factor of 0.84 is rare. Further experiments with street models under a better artificial sky will perhaps show closer agreement between calculated and experimental values for this reflection factor of the façades. For the other reflection factors, 0.58, 0.35 and 0.20, the agreement between experimental and calculated values is fairly good.

References

([1]) Pleijel, G. V. "Angaende dagsbelysning." (Concerning daylight). Roy. Inst. of Technology. Div. for Building Construction. Architectural thesis, 1934.

([2]) Pleijel, G. V. "Reflected Daylight and Model Studies." Building Research Congress 1951. Division 3, pp. 167-171.

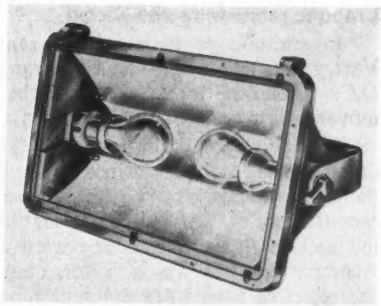
([3]) Pleijel, G. V. "Daylight Investigation." Swedish State Committee for Building Research. Report No. 17, 1949.

The A.S.E.E. Exhibition

Lighting exhibits at the exhibition organised by the Association of Supervising Electrical Engineers held at Earls Court, March 16-20.

Ediswan "Blendolite" industrial blended unit

The Edison Swan Electric Co., Ltd., showed for the first time their new "Utilux" range of fluorescent lighting equipment. This range consists of a number of alternative reflectors used with one or two lamp channels, housing control gear, to form a complete range of industrial luminaires. The range includes steel reflectors finished in high-gloss white enamel, either vitreous or stoved, with or without upward lighting slots, and smooth "Perspex" reflectors. For side angle lighting there is a one-lamp reflector in polished anodised aluminium or vitreous or stoved enamel. Another new product shown was the "Blendolite" industrial blended luminaire in the design of which particular attention has been paid to the problem of heat generated by the lamps. Baffle plates above the lamps direct the heat away from the lamp caps and lampholders; the choke is placed below the level at which heat is generated and all wiring is fire-resisting dielectric cable with porcelain-beaded connections to porcelain lampholders.



Benjamin trough floodlight

The Benjamin Electric, Ltd., stand was divided into four sections—fluorescent, industrial, outdoor and commercial, each section displaying applicable lighting equipment. A range of new luminaires was exhibited for the first time, including a number of new floodlights; a 1-kw. high-bay unit; a 1-kw E.D. dispersive reflector; a blended light fitting employing tungsten and E.D. reflectors and a convector type "Mobilux" overlamp reflector incorporating the principle of through convection currents and the provision of upward light, and many others. Also shown for the first time were the new plastic diffusing screens for "Flurolier" reflectors and bezel rings for flush mounting with ceilings to accommodate standard reflectors above them. The new Benjamin trough floodlight, which was also shown, is intended for the floodlighting of buildings or objects where the length of beam is limited by the space available. Its method of mounting allows almost complete rotation. It can be used with two 150-watt filament lamps, two 80-watt mercury lamps or one 45-watt sodium lamp.

Falk, Stadelmann "Imperial" heavy duty unit

Metropolitan-Vickers Electrical Co., Ltd., showed 8-ft. fluorescent lamps and luminaires including two-lamp and three-lamp closed-end trough reflectors for industrial use. Other exhibits for commercial use were a pendant unit and a cornice mounting unit both designed in contemporary style. Fluorescent moisture-proof and street-lighting luminaires were also shown.

The exhibits of J. A. Crabtree and Co., Ltd., were conveniently mounted on counters and on the exterior panels of a central office structure. Among the new products were the new Type A.C. flush switch range. The

Revo "Hatfield" lantern for Group "B" street lighting

Holophane "Steplite" ceiling unit

mechanism of this switch is protectively sealed against dust and the switch may be operated silently; the combined switch-and-plate unit permits for self-adjustment to variations in plaster level without the employment of special devices. Many other examples of the extensive Crabtree range were also shown.

In addition to their existing range of solenoids the Varley Magnet Co. showed a new range of small A.C. and D.C. solenoids intended for light electro-mechanical movements where small dimensions are called for.

The principal exhibit on the Thorn Electrical Industries, Ltd., stand described the production in the company's chemicals factory of high-grade phosphors for the manufacture of "Atlas" fluorescent lamps. In an adjoining section fluorescent lamps were arranged to form a "comparator" by which visitors could see for themselves the effect of light from different tubes on the colours of fabrics, packages, foods and other objects. A selection from the current range of fluorescent luminaires was also shown.

Falk, Stadelmann and Co., Ltd., showed some examples from their range of luminaires for industrial, commercial and decorative purposes. These included the "Imperial" heavy duty unit which is constructed of cast aluminium. These units are vapour-proof and dust-proof, and are suitable for use in humid and corrosive atmospheres both indoor and outdoor. They are for use with 300- and 500-watt gasfilled lamps or 250- and 400-watt H.P.M.V. lamps.

The General Electric Co., Ltd., displayed a wide variety of switchgear, measuring instruments, installation material and similar products. "Osram" fluorescent lamps in the new colours and efficiencies were also on view.

The Revo Electric Co., Ltd., displayed a comprehensive range of public and industrial lighting equipment and switchgear. This included a new type "Sol-etern" lantern, using three 5-ft., 30-watt lamps, comprising aluminium canopy, internal reflector, and one-piece cover of clear "Perspex" with diffusing ends, and the junior "Festival" lantern enclosing cover of opal "Perspex" for two or four 2-ft. fluorescent lamps. Industrial luminaires included a new dust-proof type for 5-ft., 80-watt fluorescent lamps, and a new blended unit carrying tungsten and mercury lamps.

The Ekco-Ensign Electric, Ltd., stand featured over 30 fluorescent luminaires specially designed for industrial, commercial and decorative purposes. The company's wide range of lamps, control gear, accessories, tungsten lamps, and luminaires were shown .

The theme of the Philips Electrical Ltd. exhibit was the versatility of their instant self-start fluorescent lighting system. The wide range of luminaires and accessories designed for this form of lighting lend themselves to highly individual treatments and some interesting uses were shown. A new range of contemporary-style indirect and semi-indirect luminaires using internal reflector bowl lamps were displayed for the first time together with a new desk lamp and an inexpensive floor standard.

Amongst the Simplex Electric Co. Ltd. exhibits was their flameproof handlamp which is the only fully certified flameproof handlamp available with Ministry of Fuel and Power certificate covering Groups II and III gases. This handlamp can be used in conjunction with the Simplex flameproof interlocking switch socket and plug. Flameproof lanterns were also displayed.

Siemens Electric Lamps and Supplies Ltd. showed a representative selection of their products ranging from cables to the latest development in lamps and their applications. The lamp section included a range of general service and special purpose lamps and luminaires. The fluorescent lamps display featured the new Siemens "Social Colour" De Luxe Warm White lamp specifically intended for domestic use in the home and restaurants or other places where people congregate for leisure and pleasure.

A representative selection of lamps and luminaires was shown on the B.T.H. Co., Ltd., stand, the lighting of which was entirely by the "New Warm White" fluorescent lamp. The Mazda "Deluxe Warm White" fluorescent lamp was also shown. A feature of the stand showed four stages in the erection of a "Monolux" fitting by the B.T.H. "Pendicone" suspension method and showed the ease of relamping with B.C. lampholders. A lamp comparison cabinet was shown which was divided into two identical compartments with viewing apertures and lighting controlled by six-way switches so that any of five fluorescent lamps or a bank of tungsten lamps could be switched on in either section. The two new colour fluorescent lamps were included.

Crompton Parkinson, Ltd., showed their "Light Line," a continuous trunking system of fluorescent lighting that can be erected quickly and fixed to or suspended from any form of overhead structure without special work. The number of reflectors can be varied as required.

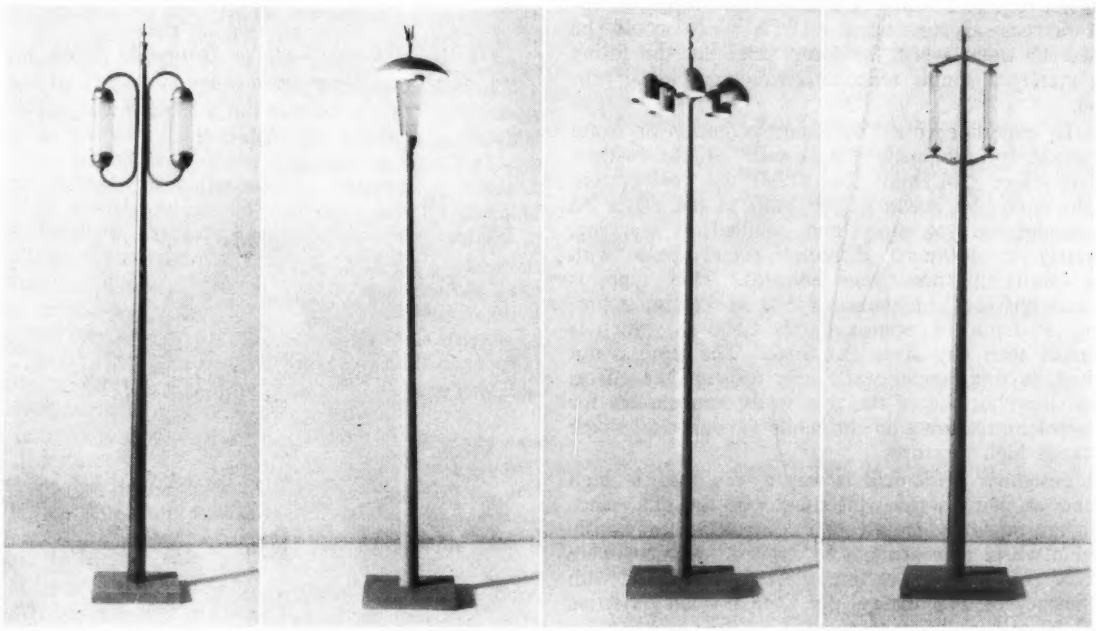
Holophane Ltd. showed a wide range of lighting units for use in industry, commercial and public buildings. Among them were flameproof units of the type which are extensively used in oil refineries and other hazardous situations in Britain and overseas. Of particular interest in the commercial lighting section was a range of Holophane "In-bilt Controlens" units which, employing prismatic lens plates, give a fine degree of light control with a choice of intensive concentrating and asymmetric light distributions depending upon the type of plate employed. A new "Steplite" close ceiling unit with 14-in. diameter glass was also exhibited; this extends the range of a popular line.

Dorman and Smith, Ltd., showed their newest range of switchgear, the "TS" range, miniature circuit breakers, luminaires and a new range of distribution boards, the "Dorman" and the "ASC" types, incorporating either rewirable or H.R.C. cartridge fuses. D.S. Plugs, Ltd., showed a new flat pin type domestic plug to B.S. 1363, the fuse of which can be changed without the use of tools.

Designs for Lamp Columns in Kuwait

During the last two or three years Kuwait, the small State at the head of the Persian Gulf, has been much in the news by reason of the development of the oil resources of the country by the Kuwait Oil Company. This development has brought a new prosperity to the country, one result of which is a decision to replan the old walled town of Kuwait itself. This task has been given to the firm of Minoprio and Spencely and P. W. Macfarlane, the London firm of architects and town planning consultants.

The replanning involved is quite extensive and amounts almost to rebuilding the whole town on modern lines whilst retaining some of its traditional features. Not only is the existing town to be replanned but the area



(a) (b) (c) (d)

of the town will be extended and a new road system has to be developed. Street lighting will be installed on the new roads, and one of the jobs of the consultants was to design appropriate street lighting standards.

The photographs on this page show the designs, in model form, which have been submitted to the Government of Kuwait. It is understood that designs (a) and (b) have been approved and are now out to tender. Design (a), however, will have three lanterns instead of two as shown. It is intended that in all cases the height of the light source above the ground should be 25 ft. Designs (a) and (d) are intended to accommodate up to four fluorescent lamps per lantern, whilst either fluorescent or tungsten lamps might be used with type (b). The material for the construction of the lamp standards has not yet been decided but it is understood that it may be of steel, aluminium-alloy, or, a new material, fibreglass.

Floodlight for Underwater Television

An underwater floodlight employing a 1,000-watt "Osram" lamp has been used in conjunction with television apparatus during the search for the wreckage of the B.O.A.C. Comet aircraft which crashed off the Isle of Elba on January 10. The lamp and fitting were developed in collaboration with the Admiralty Research Laboratories by The General Electric Co., Ltd.

The object in undertaking this development work was to produce a light for deep-water television which would not require a heavy or complicated fitting. It was therefore necessary to design a bulb which could be exposed to water when the lamp is alight, the fitting being merely a simple reflector giving mechanical protection.

Early experiments to overcome problems of strain were made by producing "thick-wall" bulbs (with a glass envelope 3-4 mm. thick), but the temperature gradient from the inside of the bulb to the water on the outside was too steep and resulted in cracking. Ultimately a 100-mm. diameter round bulb with 1-mm. wall thickness was adopted. This type is able to withstand a pressure of 650 lb. sq. in., representing a depth of approximately 1,500 ft., which is far deeper than any diver can work. The lamp is not switched on until under water. In resisting the effects of heat the elasticity of the thin walls compensates for the steep temperature gradient, while the spherical shape withstands high pressures.

In designing a filament it was agreed that a high efficiency in lumens per watt should be the aim, since the highest possible energy conversion rate was obviously desirable where power might be limited. Lumens were therefore considered more important than life, and with an efficiency of 24.5 lumens per watt a mean objective life of 50 hr. has been accepted.

To protect the lamp cap from water, a special 8-in. long tubular rubber moulding has been produced. This moulding tapers from $2\frac{3}{4}$ in. to $1\frac{3}{4}$ in., and the neck of the lamp fits tightly into the wide end, locating automatically in a special holder with two brush-type side contacts. Twin T.R.S. cable to the lampholder passes through the narrow end of the moulding, where the entry is sealed by tightening a clip. A screw clamp on the neck of the reflector serves a similar purpose at the wider end of the moulding.

The anodised aluminium reflector is of simple design, and shrouds the lamp to protect it from mechanical damage. Lamp, reflector, and accessories together weigh only some 3 lb. When used for underwater television the fitting is attached to the camera by an arm, so that the area illuminated by the lamp always corresponds with the lens viewing angle. It could also be used by divers, as the rubber shroud is of a convenient size and length for use as a handle, or for gripping under the arm when both hands are required for work.

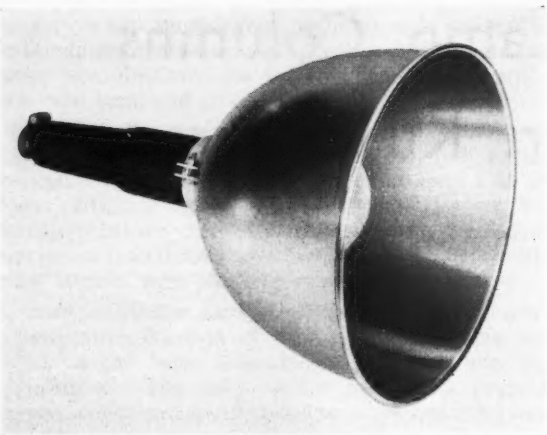


Fig. 1. 1,000-watt lamp in lightweight fitting for underwater use.

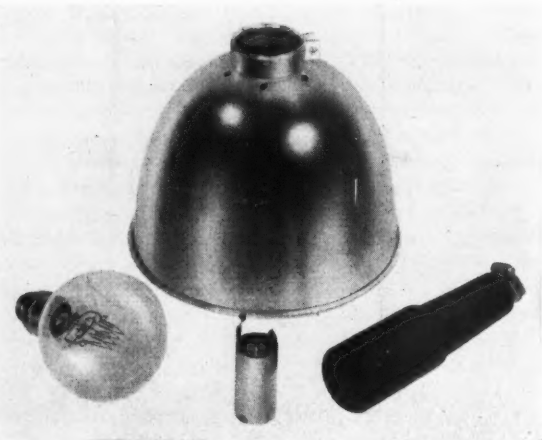


Fig. 2. Details of lampholder and rubber moulding.

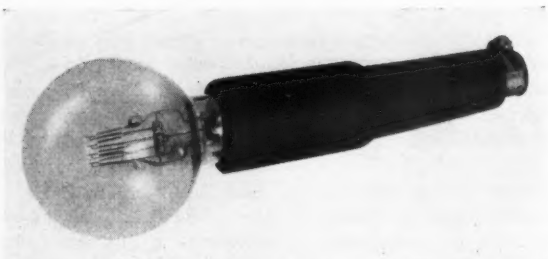


Fig. 3. Lamp located in the rubber moulding which protects the cap from water during use in the underwater floodlight.

National Illumination Committee of Great Britain*

Report for the Year 1953

The principal event of the year for the committee was the meeting with the president of the International Commission on Illumination, Dr. Ward Harrison, on June 11. Dr. Harrison had been visiting a number of countries in Europe and had taken the opportunity of personally meeting the members of a number of national committees. The president indicated that the 1955 meeting of the Commission would be held in Zurich, Switzerland, at the beginning of June, and that in order to ensure the circulation of preprints of reports and papers in good time all such material should be in the hands of the Central Bureau by December, 1954. The president reported that Brazil has now become a full member of the Commission. It was agreed with the president that residents in Colonies interested in the work of the Commission should receive papers through the corresponding national committees and that they should not normally be given the status of local representatives, which applied more particularly to nationals of autonomous countries.

The distribution of Harath Letters has continued, and consideration was given by the C.I.E. Panel to a number of observations and suggestions put forward therein by the Central Bureau. The matters dealt with were principally concerned with the production of preprints and the final proceedings.

An inter-sessional meeting on Natural Daylight was held in France in May; the meeting lasted three days and was attended by 16 delegates from seven countries, and in the course of the proceedings 21 papers were presented. The secretariat responsibilities were delegated to Great Britain by Australia.

A meeting took place in Arnhem, Holland, in May, when representatives of several countries concerned with automobile lighting discussed the tests to be carried out in the U.S.A. early in 1954; one of the subsidiary tests was carried out at the Road Research Laboratory in November. At the meeting in Arnhem, consideration was also given to a request from I.S.O. for the drafting of specifications relating to tail lamps and stop lamps.

The sub-committee on Lighting for Photography, Cinema and Television Production has been reconstituted with Mr. W. R. Stevens as chairman. In addition, two new sub-committees are now functioning; these are concerned respectively with Lighting in Hazardous or Corrosive Situations, under the chairmanship of Mr. F. C. Smith, and that on Railway and Dock Lighting, of which Mr. A. J. Bull is chairman.

A 15,000-word document entitled "The Design of the Visual Field" has been prepared by the sub-committees on Predetermination of Illumination and Luminance, and Estimation of Comfort in Lighting. This document

* The N.I.C. is affiliated to the International Commission on Illumination. This report was approved at the Annual General Meeting of the Committee held on Thursday, January 28, 1954.

Constitution of Committee, December 31, 1953

Officers :—

Chairman : DR. J. W. T. WALSH.
Vice-Chairmen : DR. S. ENGLISH and F. C. SMITH.
Hon. Treasurer : DR. S. ENGLISH, Holophane House, Elverton Street, S.W.1.
Hon. Secretary : L. H. MCDERMOTT, National Physical Laboratory, Teddington, Middlesex.
Representatives of Great Britain on the Executive Committee of the International Commission on Illumination : DR. S. ENGLISH and F. C. SMITH.

Nominated by the Sponsoring Organisations :—

Illuminating Engineering Society : DR. J. N. ALDINGTON, G. G. BAINES, J. G. HOLMES, L. H. MCDERMOTT, J. M. WALDRAM.
Institution of Electrical Engineers : R. O. ACKERLEY, PROF. H. COTTON, C. W. M. PHILLIPS, H. R. RUFF, DR. J. W. T. WALSH.
Institution of Gas Engineers : J. B. CARNE, A. G. HIGGINS, P. RICHBELL, F. C. SMITH, D. M. THOMPSON.

Nominated by the Co-operating Organisations :—

Admiralty : H. A. L. DAWSON.
Air Ministry : J. E. CARPENTER.
Association of Public Lighting Engineers : E. HOWARD, C. C. SMITH.
British Electrical and Allied Manufacturers' Association : J. M. H. STUBBS.
British Electricity Authority and its Area Boards : R. BIRT, M. D. STONEHOUSE.
British Electrical Development Association : V. W. DALE.
British Plastics Federation : DR. W. E. HARPER.
British Standards Institution : J. F. STANLEY.
Department of Scientific and Industrial Research : (*National Physical Laboratory*) DR. L. A. SAYCE, DR. W. S. STILES; (*Building Research Station*) DR. R. G. HOPKINSON.
Electrical Contractors' Association : A. H. OLSON.
Electric Lamp Manufacturers' Association : L. J. DAVIES, W. J. JONES, E. B. SAWYER.
Electric Light Fittings Association : G. CAMPBELL, W. E. J. DRAKE.
Gas Council : J. B. CARNE, F. W. SANSOM.
Glass Manufacturers' Federation : DR. W. M. HAMPTON.
Institution of Municipal Engineers : C. HARPER.
Medical Research Council : DR. W. J. W. FERGUSON, H. C. WESTON.
Ministry of Civil Aviation : H. G. LITCHFIELD.
Ministry of Fuel and Power : J. COWAN, H. ROBINSON.
Ministry of Health : D. A. HUGHES.
Ministry of Labour and National Service : M. A. MCTAGGART, J. O. PEACOCK.
Ministry of Supply : E. S. CALVERT, J. L. RUSSELL, BRIG. N. A. M. SWETTENHAM.
Ministry of Transport: DR. H. F. GILLBE, W. HADFIELD.
Ministry of Works : W. E. RAWSON-BOTTOM.
National Coal Board : D. A. STRACHAN, P. N. WYKE.
Post Office : A. E. PENNEY.
Railway and London Transport Executives : A. H. COLE, H. E. STYLES.
Society of British Gas Industries : S. F. BAKER, P. C. SUGG.
Society of Glass Technology : DR. S. ENGLISH.

appeared in the Transactions of the Illuminating Engineering Society, **18**, No. 8, 1953, and copies of this, which also contained a paper on "Classification of Diffusing Materials," have been distributed to all member countries.

A questionnaire has been sent to member countries on the subject of Theatre Stage Lighting and questionnaires have been received from the United States on Operating Accessories, from Germany on Home Lighting and Hotel Lighting, from Finland on Hospital Lighting, from Belgium on Mine Lighting, from Australia on Natural Daylight, from Holland on Aviation Ground Lighting, from France on Signal Lights, and from Israel on Lighting Legislation. Less formal documents have also been sent and received on other subjects.

The Mine Lighting sub-committee has revised the sections of its 1946 report dealing with portable lamps and pneumatic electric units and the new sections will be presented at meetings of the Mining Institute of Scotland.

As a result of changes which have taken place in the membership of the Committee, Dr. W. J. Wellwood Ferguson is now one of the representatives of the Medical Research Council in place of Prof. Hartridge, whilst Mr. A. H. Cole has taken the place of Mr. Bull as the representative of the Railway Executive.

It is of interest to note that the following new standards have been issued by the British Standards Institution: B.S. 1611: Glossary of colour terms used in science and industry; B.S. 1980: Portable electric handlamps. The following British Standards have been revised: B.S. 233: Glossary of terms used in illumination and photometry; B.S. 535: Bulbs for miners' electric lamps; B.S. 1304: Screen luminance for the projection of 35 mm. film; B.S. 1376: Colours of light signals.

J. W. T. WALSH,
Chairman.

A Case for Better Street Lighting

The Street Lighting Committee of the British Electrical Development Association have recently made a close study of road accidents during the hours of darkness. The outcome of this study was presented at a recent Press conference by Mr. W. Robinson, the B.E.D.A. Lighting Officer, as follows:—

Dealing with the situation between the hours of 7 a.m. and midnight, during which, it was stated, over 95 per cent. of all road accidents occur, it was pointed out that on average during the period 1945-52 two and a half times as many adult pedestrians were killed per hour at night as per hour during the day. In 1952, twice as many adult pedestrians were seriously injured and twice as many vehicle drivers were killed per night-time hour as per day-time hour. This situation was a result partly of the greater frequency of accidents at night and partly of the greater severity of night accidents.

In 1952, out of every 1,000 reported road casualties (all classes of road user), by day 19 were killed, 227 seriously injured, and 754 slightly injured; by night the breakdown was 33 killed, 287 seriously injured, and 680 slightly injured. Out of every 1,000 adult pedestrian casualties by day 37 were killed and 245 seriously injured; by night the figures were 65 killed and 330 seriously injured.

The effect of putting back the clock in October was highly significant. In 1951, 1952 and 1953, day-time accidents in October were virtually unchanged from those in September, but night-time accidents during October were 70 per cent. higher than those during September. Combined day and night accidents in October were regularly 30 per cent. higher than in September. It was obvious that this situation could only be due to the instantaneous increase in the hours of darkness.

The number of road vehicles licensed was now over 5,000,000 compared with 3,000,000 in 1945. One result of this increase in road usage was that, whereas in 1945 only 64 adult pedestrians were killed at night for every 100 by day, in 1952 more adult pedestrians were killed on roads at night than by day.

Since the above figures were given, the accident figures for 1953 have been made available, which show the following increases in road casualties over the 1952 figures:—

	Per cent. increase	
	Day-time	Night-time
Casualties (all types)	7	16
Fatalities	3	18
Fatalities to adult pedestrians	1	24

Mr. Robinson said that the study clearly indicated that:—

(i) The average night accident resulted in a very high rate of mortality and serious injury.

(ii) The risk of fatal road accident by night was three times that by day, and of serious injury twice that by day.

(iii) The situation was deteriorating still further as more road vehicles were licensed.

(iv) It was necessary to view the importance of improving the present standard of street lighting against the fact that more than three-quarters of all accidents regularly occur on "restricted" roads, i.e., roads with a speed limit *and already equipped with some form of street lighting.*

The view of B.E.D.A. was that the modernisation of existing street lighting should receive the highest priority, and they have stated the following opinion regarding the allocation of capital for street lighting improvement:—

"Capital expenditure for the modernisation of traffic route lighting is at present restricted, through the exercise of Defence Regulation 56A, to an annual figure at which safe street lighting throughout the country will not be achieved in less than 15-20 years. For several years to come the pace of street lighting improvements will barely be sufficient to offset the natural traffic increase and the consequent increase in road congestion; it will certainly not be sufficient to make any impression on the present night-time rate of road casualties until resources are set free to finish the job. A stimulus in this direction is surely provided by the fact that each year taken off the time for fulfilment of a national street-lighting programme may well be equivalent to a reduction of 20 per cent. in the total of those killed and seriously injured in that year."

I.E.S. Activities

Summer Meeting

Details of the Summer Meeting to be held at Southport from May 18—21 were widely circulated some weeks ago, and it appears that the attendance at Southport is likely to be a good deal higher than at previous meetings. Reservation forms have now been sent to all I.E.S. members and to others who have indicated their intention of being present at the Summer Meeting. The form attached to the previous notice was intended to give an indication of the numbers likely to take part in the various events so that adequate arrangements could be made by the organising committee; those wishing to take part in the social events or visits must complete the registration form (the buff one) in order to obtain tickets.

The following information in addition to that given on the registration notice will be of interest to those intending to be present at Southport:—

Hotel Accommodation.

The Palace Hotel (headquarters) is fully booked. Those who have not yet reserved accommodation should write to the General Manager, Chief Information Bureau, Town Hall, Southport, stating their requirements. Intending visitors from overseas should write to the I.E.S. Secretary.

Display of New Lighting Equipment

This will take place at the Palace Hotel on the evening of Wednesday, May 19. Firms or organisations wishing to display items should send a description of the item to the I.E.S. Secretary. It is intended that only new features should be shown. The display will be for one evening only.

Meeting of Members of American I.E.S.

At the request of the American I.E.S. arrangements have been made for a meeting of members of that society resident in the United Kingdom to be held at the Palace Hotel on the Saturday morning at the end of the Summer Meeting. The meeting will be from 10 a.m. until approximately 11.30 a.m. Non-members of the American society are welcome to attend this meeting.

Dow Golf Cup

As at previous I.E.S. Summer Meetings, one of the "off-duty" events at Southport will be play for the Dow Golf Cup. The competition, which is open to any member of the Illuminating Engineering Society who belongs to a recognised golf club, will be played as an 18-hole Stableford competition over the course of the Southport and Ainsdale Golf Club between May 18 and noon, May 21, inclusive.

Competitors may take out as many cards as they please at an entrance fee of 2s. 6d. per card, cards being obtainable from the Golf Committee, consisting of C. R. Bicknell, N. Boydell and A. G. Penny, or from the I.E.S. Office at Southport. Cards must be returned to any member of the Golf Committee as soon as possible after completion of the round, and no card will be accepted after 12.30 p.m. on May 21.

Green fees must be paid to the Southport and Ainsdale G.C. direct, and all competition rounds must be played strictly in accordance with the Rules of Golf and with the local rules of the Southport and Ainsdale G.C.

To the points accumulated over the round the competitor will add three-quarters of his lowest club handicap, the maximum handicap admissible being 24; i.e., no player may receive more than 18 points allowance. Two points will be deducted from the gross score of any player who is a member of the Southport and Ainsdale G.C.

Ties will be decided on the last nine holes or, if necessary, the last six or the last three.

The first tee will be reserved between 12.30 p.m. and 2 p.m. on Thursday, May 20, for a Ladies' Competition; otherwise we may play when we like, starting in conformity with the Club rules as regards precedence.

Any matters regarding the interpretation of these rules or otherwise regarding the competition should be raised with a member of the Golf Committee.

☆ ☆ ☆

As mentioned above, the attendance at Southport is likely to be a record for the I.E.S. Summer Meeting. The number of visitors from overseas is also likely to be up; it is already known that there will be visitors from France, Holland, Denmark, Finland, Norway, Australia and New Zealand. Meetings of this kind can take any one of numerous forms, and one or two new features (e.g., the factory visits—which appear to be very popular) have been introduced into the programme for Southport. It would seem, therefore, that the general pattern of I.E.S. Summer Meetings is approved, but perhaps one feature which helps to make them a success is that adequate time is given for the discussion of the papers presented (a lesson which was learned at the 1948 meeting, when the time allowed was too short). Speaking in the discussion on the paper presented by H. C. Weston at the American I.E.S. conference last year, Ward Harrison had this to say for the British meeting: "I am always impressed by the European viewpoint and the thoroughness with which they go into each subject under discussion. In a half day's session of the British Society they never have more than two subjects listed for discussion; in fact, often only one, and that means that there is really time to go into the subject and the chairman doesn't have to look at his watch and say 'we're already behind schedule and there will be opportunity for only one discussion of this paper'! On the other hand, there are numerous and pointed discussions in England, and if any errors exist in the author's reasoning they will quite probably be brought to light. I am inclined to the opinion that the British get more out of one or two papers per session than we do out of five."

Dr. Harrison also had some other complimentary things to say about our Society, but we will confine our quotation to that given above. No doubt the Summer Meeting Committee will be pleased to have this support —for, strangely enough, their problem is frequently to know what to leave out of the programme rather than what to put in.

And finally, from what we know of the papers, there will be plenty to discuss at Southport.

London

At the London meeting, on March 10, Mr. J. B. Collins and Dr. R. G. Hopkinson presented a paper entitled "Flicker discomfort in relation to the lighting of buildings." Flicker is a factor introduced into the lighting problem from the popularity of discharge lamps, especially fluorescent tubular lamps. Such lamps have a much greater degree of light fluctuation than filament lamps of comparable light output. Flicker in modern lighting is shown by an investigation carried out by the authors not to be a serious problem. It does, however, give rise to complaint because some slight discomfort or annoyance is caused to some people on some occasions. People vary very widely in their sensitivity to flicker and any one individual will vary in his sensitivity from time to time.

In a well-engineered lighting installation, flicker should be noticeable only by a small percentage of the general population, and only on large bright areas such as the white paper on a drawing board, or a luminous ceiling. By the use of techniques such as two lamps on a "lead-lag" circuit, or three lamps on the phases of a three-phase supply, the possibility of annoyance from flicker can be effectively eliminated.

The nature of the visual processes, and of the engineering factors, which together govern flicker perception in lighted interiors, have been investigated by the authors. Flicker is more readily perceived on large areas than on small, and the brighter the area the greater the chance of flicker being seen. A large area of moderate brightness may, however, show flicker more readily than the smaller brighter lamp which illuminated it. A lamp which does not "black-out" between cycles (on an A.C. supply) will cause less flicker than one which does. At the present moment, most "warm" colour lamps have a significant amount of afterglow, and so do not black-out. Other developments on luminescent powders may enable these advantages to be shared by lamps of "colder" colour. Two present-day "cold" lamps on a lead-lag circuit exhibit the same effective flicker characteristic as a typical "warm" lamp alone, i.e. the circuit supplies the afterglow lacking in the fluorescent powder of the "cold" lamps.

Faulty starters, old lamps, and circuit faults can introduce severe flicker, but these are matters which are easily recognised and put right. A significant factor which is not recognised is, however, the presence of a 50-cycle component in the wave-form of the light output of the lamp, superimposed on the normal 100-cycle wave form. Part of this can be eliminated by screening the ends of the lamp, where the well-known 50-cycle "end flicker" occurs, but some lamps, not all old lamps, show some 50-cycle asymmetry all along their length. A small amount, 2½ per cent. of the total light output, of such a component is readily visible as flicker by most people under typical drawing-board conditions. The prevalence of this factor in practice is not known but it is believed by the authors to be one of the chief causes of noticeable flicker in practice.

Transvaal Group

The first regular meeting of the newly formed Transvaal Group of the I.E.S. was held at the Public Library in Johannesburg on February 16 at 8 p.m. Members in the Transvaal are fairly widely scattered but there were 61 people present at the meeting; the majority were visitors some of whom will no doubt join the new group.

An address was given by Mr. F. L. Cator, the first chairman of the group. The first part, for the benefit of the visitors, served as an introduction to the Society and gave a brief historical survey of its activities.

The latter part was a paper dealing with "Light Source Comparisons." Mr. Cator had arranged a very impressive display of incandescent and discharge lamps. This, together with a number of very carefully prepared slides, greatly added to the interest and informative value of what he had to say.

Mr. Downie, the President of the South African National Committee on Illumination, proposed a vote of thanks to Mr. Cator, this was seconded by Mr. Gill, Chairman of the Fluorescent Fittings Association.

The second meeting of the group will be held on April 13 when Mr. Downie will read a paper on street lighting.

Opening meeting of the I.E.S. Transvaal Group at Johannesburg Public Library on February 16. In the front row (left to right) are Mr. F. L. Cator (chairman), Mr. R. S. Yates (hon. secretary), Mr. J. V. Silverston (vice-chairman) and Mr. J. F. Dempster (hon. treasurer).

Nottingham Centre

On February 4 the Nottingham Centre had a lecture from Mr. W. A. Allen, B.Arch., A.R.I.B.A., senior architect of the Building Research Station, on "Daylight and Artificial Lighting in Factories." The audience included a number of local architects and architectural students.

Mr. Allen gave details of past and present practice in the design of roof structures both in this country and in the United States. He gave details of windowless factories erected in the United States and of the American practice of using a high average illumination to allow of adaptability in the use and placing of machinery and equipment. He showed an excellent series of colour slides depicting the increasing use of colour, discreetly but skilfully, in schools and factories, both for interior decoration and on machinery itself.

Mr. A. E. Eberlin, F.R.I.B.A., opened the discussion and reiterated the speaker's appeal for closer co-operation between lighting engineers and architects. A vote of thanks to the speaker was proposed by Mr. A. Hacking.

Sheffield Centre

At the February meeting of the Sheffield Centre Mr. Antony Pott, A.R.I.B.A., A.A.Dpl., of the Architects and Buildings branch of the Ministry of Education, lectured on "Lighting in the Design of Schools."

Mr. Pott stated that there was £50,000,000 annually available for school buildings covering a wide range of requirements from nursery schools to technical colleges. Pre-war schools were generally planned for side window light to come from the left side of the child when seated in class. This method of planning was uneconomic, making only 40 per cent. of the total building space available for classrooms. Mr. Pott emphasised that the minimum level of artificial illumination of 10 lm./ft.^{2} seemed to some lighting engineers a rather low level; this, however, was the very minimum and most modern school buildings had much higher levels. He further stated that throughout an average year artificial lighting was required for only 50-60 hours, which obviously meant a rather expensive installation considering the limited use.

Mr. J. M. Whittaker opened the discussion, speaking of the difficulty of reconciling economic factors with desirable standards, suggesting that multiple-storeyed buildings with greater use of artificial lighting might be economically sound and that reduction of window space would reduce the cost of heating. Mr. E. G. R. Taylor complained of the extensive use of high-gloss paints in school decoration and the consequent specular reflection. Mr. G. L. Tomlinson spoke of the uneconomic electricity load factor of school buildings. Mr. H. B. Leighton, proposing a vote of thanks to the lecturer, said a review of the artificial lighting of pre-war school buildings was urgently needed although he was aware that little could be done structurally.

Lecture in Norway

In the midst of his engagements as President, Mr. W. R. Stevens was asked to visit Oslo to give a lecture on the subject of "Street Lighting—Ways and Means" to the Lighting Development Organisation on February 18 at the request of the Chief Engineer of that body, Mr. R. Aspestrand, who is well known in this country. He had planned to travel via Copenhagen and to see something of street lighting practice in Denmark. Unfortunately he was taken ill with influenza shortly beforehand and at the last minute was unable to go. His place was taken by Mr. J. M. Waldram, who was also suffering from a cold and nearly lost his voice before the lecture, but some expert medical help and a microphone enabled him to complete it. The audience numbered about 70, all able to follow a discourse in English. The lecture described briefly the practice and theory which have developed in Great Britain, and went on to discuss the design of lighting equipment, illustrated by a "ray path" demonstration, examples of lanterns and a colour film. The testing of lanterns was described, and the lecture included some information not previously published on the performance of fluorescent lanterns at low temperatures and the effects of wind—subjects of great interest in Norway. It is interesting to learn that a British fluorescent lantern can be expected to function satisfactorily and to give a large fraction of its normal output even in the conditions of a Norwegian winter.

The Norwegians have a delightful custom, which we might note, of having refreshments after the lecture and before the discussion. Nearly everyone stayed for a lively series of questions, which were answered by the lecturer, and the meeting closed with a vote of thanks by the chairman, Mr. Williamsen. Mr. Waldram conveyed the greeting of the I.E.S. to their Norwegian friends.

Street lighting in Oslo appears to follow practice as it was in Germany before the war and that in Stockholm; most of the streets are lighted by lanterns with an opal shade giving a near cut-off distribution, usually centrally suspended. One installation of cut-off lanterns with sodium lamps, rather low mounted, was noticed. A problem in Norway in the winter is that even in the centre of the city most roads are snow-covered.

Forthcoming I.E.S. Meetings

LONDON

April 13th

Sessional Meeting. "Illuminants for Colour Reproduction and Printing," by H. M. Cartwright. (At the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) 6 p.m.

GROUPS AND CENTRES

April 1st

GLASGOW.—Discussion: "The Lighting Engineer." (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

GLOUCESTER AND CHELTENHAM.—"The Effect of Light in the Growth and Development of Plants," by Miss D. Vince. (At the General Electric Co., Ltd., 2, St. Aldgate Street, Gloucester.) 6.30 p.m.

NOTTINGHAM.—"Lighting at Home and Abroad," by A. D. Charters. (At the Demonstration Theatre of the East Midlands Electricity Board, Smithy Row, Nottingham.) 6 p.m.

April 2nd

BIRMINGHAM.—"Television Studio Lighting," by D. C. Lightbody. (At "Regent House," St. Phillip's Place, Colmore Row, Birmingham.) 6 p.m.

April 7th

EDINBURGH.—Annual General Meeting and Films. (At the Conference Room, Manor Club, 12 Rothesay Place, Edinburgh, 3.) 7 p.m.

MANCHESTER.—"The Lighting of Industrial Open Spaces," by J. S. Smythe. (At the Demonstration Theatre of the North Western Electricity Board, Town Hall Extension, Manchester.) 6 p.m.

NEWCASTLE.—Annual General Meeting, followed by an Address. (At the Roadway House, 8, Oxford Street, Newcastle-upon-Tyne, 1.) 6.15 p.m.

April 12th

SHEFFIELD.—An Address by the President, followed by Annual General Meeting. (At the Medical Library, The University, Western Sheffield Bank, Sheffield, 10.) 6.30 p.m.

April 13th

STOKE-ON-TRENT.—Meeting to be announced. (At the Lecture Hall of the Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent.) 6 p.m.

April 15th

GLOUCESTER AND CHELTENHAM.—Annual General Meeting. (At the General Electric Co., Ltd., 2, St. Aldgate Street, Gloucester.) 6.30 p.m.

April 17th

HUDDERSFIELD.—Annual General Meeting. (At the Yorkshire Electricity Board's Showrooms, Market Street, Huddersfield.) 7.30 p.m.

CARDIFF.—Film Evening. (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff.) 5.45 p.m.

April 20th

LIVERPOOL.—"Sports Lighting," by M. W. Peirce. (At the Merseyside and North Wales Electricity Board's Service Centre Lecture Theatre, Whitechapel, Liverpool.) 6 p.m.

April 21st

NORTH LANCASHIRE.—Annual General Meeting. (At the Demonstration Theatre of the North Western Electricity Board, 19, Friargate, Preston.) 7.15 p.m.

April 23rd

BATH AND BRISTOL.—Annual General Meeting and Film Show. (At the South Western Electricity Board, Lecture Theatre, Old Bridge Street, Bath.) 7 p.m.

April 26th

LEICESTER.—"Lighting in the Textile Industry," by J. W. Howell. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 7 p.m.

Personal

The Edison Swan Electric Co. Ltd., announce the appointment of MR. J. PETRIE as manager of their Nottingham district office as from February 1.

MR. A. E. ILIFFE, director and general sales manager, The Benjamin Electric Ltd., left for an overseas business tour on Wednesday, February 24. His object in visiting India, New Zealand, Australia and Singapore is to make contact at director level with the main distributors and to further the interests of better lighting. He expects to be back in London towards the end of June.

MR. F. N. WOODS, of Metropolitan-Vickers Electrical Co. Ltd., has recently relinquished the duties of superintendent, lamp and lighting department, London, and is succeeded by MR. S. G. TURNER, F.I.E.S. MR. J. J. BERRY has become superintendent, lamp and lighting department, Cardiff.

MR. H. ATHERTON, who has represented The Benjamin Electric, Ltd., in the north-west for many years, has been appointed the north-western area manager for S. O. Bowker, Ltd., of Birmingham. MR. ATHERTON will operate from the branch office at 85, Mosley Street, Manchester. Telephone: CENtral 0051.

Ekco-Ensign Electric, Ltd., announce the recent appointment of MR. T. HALDANE-WILLIAMS as their representative covering the counties of Oxfordshire, Buckinghamshire and Berkshire. MR. HALDANE-WILLIAMS operates from the company's southern sales office at 45, Essex Street, Strand, London, W.C.2.

Philips Electrical, Ltd., Lighting Division (special lamps dept.), announce the appointment of MR. R. W. UNWIN as photographic specialist. Before joining the staff of Philips Electrical, Ltd., he was with Messrs. Kodak, Ltd.

Obituary

The death occurred in Liverpool on February 28 of Mr. Alfred E. Darlington, who had been employed by the British Thomson-Houston Company for 43 years. A member of the local committee of the Electrical Industries Benevolent Association, Mr. Darlington was elected chairman at the beginning of this year. He was the first chairman of the Liverpool Centre of the Illuminating Engineering Society. Mr. Darlington was 68. He leaves a widow and three grown-up sons.

Trade Notes

W. W. HAFFENDEN LTD. announce the following additions to the "Duraplug" range of unbreakable rubber plugs and sockets: 13-amp. 3-pin fused plug, 5-amp. 3-pin panel mounting plug and 5-amp. cable coupler socket cover.

THE ELECTRIC LAMP MANUFACTURERS' ASSOCIATION announce that as from March 3 the price of the 75-watt reflector spotlight is reduced from 9s. 5d., including purchase tax, to 8s. 4d., including purchase tax.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD. announce that they now have a permanent exhibition stand at the Building Centre at Store Street, London, W.C.1. They also announce that, following the introduction of their "New Warm White" fluorescent lamp one of the first large-scale installations using this increased efficiency lamp will be at the London premises of Waring and Gillow Ltd., in Oxford Street, where between two and three hundred lamps will be installed by the contractors, Harris and Sheldon, of Birmingham, in the display windows. An installation of these lamps is already in operation on the Bergen Line motor ship *Venus*.

THE BENJAMIN ELECTRIC LTD. have developed a new form of Benjamin Reflector Cleaner for quick and safe cleaning of all kinds of reflecting surfaces; it also removes any static charge which may form on plastic surfaces.

Trade Literature

PRECISION COMPONENTS (BARNET) LTD.—A brochure giving a new list of KABI terminal blocks and 12-way terminal strips including the 60 amp. unit-terminal block introduced some months ago. Illustrations and prices are included with these details.

THE GENERAL ELECTRIC CO., LTD.—An illustrated leaflet giving details and prices of the "Deluxe Warm White" and the "New Warm White" fluorescent lamps.

HERBERT MORRIS LTD.—Book 215 giving full details of Morris overhead chain conveyors. This little book fully illustrates the uses for such conveyors and includes a detailed price list.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD.—Four separate three-colour publications covering general service and fluorescent lamps, automobile lamps, projector lamps and discharge lamps. The complete set is contained within a matching stiff binder.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD.—Leaflet giving details and prices of the "New Warm White" and the "Deluxe Warm White" fluorescent lamps

ELECTRIC REMOTE CONTROL CO., LTD.—Leaflet No. 104 describing a new type of multi-circuit cam-operated synchronous process timer.

THE SUN ELECTRICAL CO., LTD.—Monthly stock list giving details and prices of all electrically operated equipment.

Lighting Installation

A Drawing Office

In the new town of Stevenage, a large modern office block has been erected at the works of George W. King, Ltd. This company, which manufactures hoists and conveyors for heavy industry, employs a large staff of draughtsmen and a whole floor of the new building was set aside as a drawing office.

In planning the lighting layout special attention was given to the requirements of this department and it was decided that a system employing a blend of fluorescent and tungsten lamps would provide the most economical and satisfactory means of lighting.

Approximately 90 fluorescent luminaires using tungsten lamps as ballasts were installed at a mounting height of 12 ft. above the floor. The resulting illumination was 33 lm./ft^2. The even distribution of light which was achieved has made easier the fine detailed work involved in technical drawing.

The luminaires used were of the instant start type each containing two 4-ft. 40-watt. "Natural" colour lamps with two tungsten lamps as ballasts.

Installation by: George W. King, Ltd.
Lighting equipment supplied by: Philips Electrical, Ltd.

POSTSCRIPT By "Lumeritas"

The introduction, a month ago, of the "de luxe" fluorescent tube was the lamp manufacturers' response to a popular demand, arising from a seemingly deep-rooted preference for light of filament-lamp "quality" in some situations. Within living memory—and long before—the artificial light sources used in dwellings have all given light of this quality, or approximating more closely to it than to that of the fluorescent tubes hitherto available. Such light seems to be regarded as more "natural" at night than is any illuminant of closer resemblance to daylight; but it seems, also, to be thought a more "friendly" light—kinder to the complexion, more "warming" to the spirits and more "flattering" to foodstuffs. Well, lighting should be more than a utility—it should be an amenity as well, and if the new lamp makes it so for many people then it is to be welcomed. Some sacrifice of luminous efficiency is involved by comparison with other fluorescent lamps, but, compared with filament lamps, the gain is still considerable.

I wonder how many readers realise what a lot of technical terms are now used in lighting and photometry? I had occasion recently to consult B.S. 233:1953. in which 116 such terms are defined but, of course, this list is not exhaustive and does not include, for instance, the hackneyed term "glare." No doubt a great deal of thought and discussion preceded the final formulation of the definitions given in this glossary, but, even so, it would be remarkable if the document left no room for criticism. The term I was "looking-up" was "Lightness," and this I found in Section 4 headed "Photometric Properties of Materials." However, according to the definition, "lightness" is "the attribute of visual perception in accordance with which a body seems to transmit or reflect difusely ["diffuse by" *sic*] a greater or smaller fraction of the incident light (C.I.E.)." I cannot convince myself that "an attribute of visual perception" is a photometric property of any material, although I am satisfied that materials have a photometric property in accordance with which their apparent lightness differs when they are seen with the same incident light. Incidentally, why, I wonder, is this glossary entitled "Terms used in Illumination and Photometry" when, according to definition 105 on page 5, "Illumination" is "At a point of a surface: the quotient of the luminous flux incident on an infinitesimal element of surface containing the point under consideration, by the area of that element. (C.I.E.) Symbol E." Surely now that "illumination" has been given this special meaning it is most inappropriate to use this word—in the glossary title—in its ordinary sense, when confusion and absurdity could be avoided by using the world "lighting."

Two lighting novelties have recently received some publicity in the daily Press. One of these is a new system of lighting under development which "makes use of luminescence caused by electric currents in certain materials. A special phosphor is laid in the form of a film on a sheet of conducting glass with metal backing. A fluctuating current passed through the sheet makes the phosphor glow. The sheet can be used in any shape or size, without any need for sealing it up in a bulb or tube." This description, which several papers have quoted from the British Medical Association's popular magazine "Family Doctor," is that given by Dr. Gordon Cook, who comments that this system will make an entire wall or ceiling glow, so that the light will be more even, and less glaring. There are, of course, existing systems of lighting by which similar effects are produced, but evenness of luminance over large areas in the field of view is not so desirable as is sometimes thought. An interior made to resemble that of an integrating sphere or cube would be maddening to live in. The second novelty is the use of a 4-ft. fluorescent tube in place of the conventional automobile headlamps. Apparently, Mr. D. R. Cockings, of Redditch, has fitted such a lamp to his car, and claims that it provides an adequate driving light without being dazzling, although he proposes that in regular practice two 40-watt fluorescent tubes should be used. Obviously, the auxiliary gear has to include a device for stepping up the voltage normally available at the car battery terminals, and the idea is that, eventually, the lamp housing will be built-in in place of the "mouth-organ" grill, which is a feature of many contemporary motor-cars.

Last month I invited readers to say what they understand by "visual comfort" and how they would define it. Only one has yet responded and he is a consulting optician practising in Leeds. He is to be congratulated, incidentally, upon gaining the bronze medal for the best result in the 1953 City and Guilds Intermediate Examination in Illuminating Engineering. Commenting on the quotation I gave Mr. Berson thinks that visual comfort is too passive to be defined as implying such "positive" feelings as "sense of pleasure, well-being and satisfaction." Such feelings, he thinks, would only be evoked by the specific content of the visual field. "One would be likely," he says, "to be aware of displeasure [or dissatisfaction] in visual discomfort, but not the converse, hence the many definitions [of visual comfort] in negative terms." The meanings of the words "visual" and "comfort" says Mr. Berson, are well understood and with these in mind visual comfort can be defined "as a function of the real factors involved." The definition he offers is: "Visual comfort is that condition obtaining with a healthy visual mechanism, functionally assisted when necessary under illumination suitable for the given visual task"—and, by "functionally assisted," he means assisted by spectacles or other optical aids. This is praiseworthy brief, but not, I think, satisfyingly informative. "That condition," I take it, is one of virtually feelingless seeing—of not being "eye-conscious," and, thus far, a satisfactory condition; but this needs to be explicit in the definition.